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WORLD PETROLEUM

Security of Oil Supplies in Wartime • Will the United States Embargo Shipments to Italy? • Marked Changes in the Flow of Oil in International Trade • Oil Quotas in Japan • Census Report on Service Stations • Venezuela's Practical Petroleum Policy

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Among the shafts of hundreds of oil wells which crowd these rich fields of Sukakhany, close to the world-famous oil center, Baku, there is still preserved the altar, pillars, arches, low dome and twenty-four cells of this ancient fire-worshipper's temple and monastery. In the central courtyard where there is now a well filled with earth and stones, a mysterious fire once burned. Hindus and Brahmins journeyed from India, across Afghanistan and Persia, to worship this miraculous flame. Modern science discovered that the sacred flame, which ignited spontaneously, was a flow of natural gas bursting through a crack in the earth. The priests of the temple did not confine the fire to the altar, but, through iron pipes in the center of the temple columns, illuminated the roof on special occasions. The Sukakhany temple flourished in the 16th and 17th centuries, and existed even until the early 19th century. The last flame was lit in 1887. Since then the natural gas has been piped to the city of Baku.

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PETROLEUM

A.P.I. Estimates Reserves

ONCE MORE the American Petroleum Institute has met to discuss the problems uppermost in the minds of the nation's leading oil men, this time in Los Angeles in accordance with a suggestion made by our associated journal, PETROLEUM WORLD of Los Angeles. Reports from the Annual meeting of the A.P.I. gave early indication of where the center of interest would lie. Obviously, petroleum reserves and their bearing on government control would hold the center of the stage when the Institute met on the Pacific Coast.

Axtell J. Byles, president of the Institute in 1935 and re-elected for 1936, expressed the views of the meeting when he stated that as no shortage of petroleum supplies is in immediate prospect conservation certainly should not be made the excuse for government control of the industry. A survey completed by the Institute placed U.S. available reserves in excess of 12,000,000,000 bbl. and some 1,000,000,000 acres of prospective oil lands remain in the United States to be explored.

Said President Byles, "There are those who, believing that our petroleum resources are nearing exhaustion, advocate federal control of this industry. It is our belief that such control would be ruinous to the industry and calamitous to the country."

Many of the other important papers delivered at the meeting showed a consciousness of the overshadowing importance of a consideration of the country's reserves and the government attitude toward control of the oil industry.

It is said that the government is also preparing a survey of the available reserves which will outline a much less attractive picture than the estimates made by the members of the American Petroleum Institute.

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Japanese Oil Policy

THE JAPANESE government has recently put into effect laws governing the importation, refining and marketing of petroleum products in Japan, designed to carry forward the policy supported by the Japanese military party. Some of the conditions have proved too difficult for the compliance of international oil companies operating on the Japanese market and they have suggested to Tokyo a revision of the program in order to make it possible for them to continue operations in Japan.

The requirements for storage capacity for refineries have been carried to extreme lengths in Japan where the importance of oil for national defense is thoroughly appreciated.

However, the present policy seems calculated to defeat its own purpose in that it may succeed in driving the international companies out of the market entirely. Depending as it does for the major part of its supplies on sources outside its immediate control it would seem extremely short-sighted if the Japanese government failed to take into account the past and future services rendered by the international oil companies in assuring Japan of a reliable supply of petroleum and products.

Another point in the Japanese policy that has not yet been settled is the amount (if any) of the normal increase in consumption that may be allowed to importing companies.

On both these points it seems that a moderation of the policy sufficient to encourage the international oil companies to continue to supply the Japanese market would simply be serving the best interests of the people and the government of Japan.

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Bahrein Petroleum

OFFICIAL announcement has been made in London that the Bahrein Petroleum Company (Standard of California) is starting construction of a 10,000 bbl. per day refinery on Bahrein Island in the Persian Gulf in December where Standard of California has developed crude production. It is significant that the refinery is being constructed in such a manner as to permit of doubling its throughput capacity with but slight modification and addition.

The construction of this plant emphasizes once more the warning that the California company is serving on the international oil industry that a place must be made for the production from Bahrein. While the matter of adjusting international supplies to admit the addition of a new source may not be capable of immediate or easy solution it is to be hoped that a series of conferences on the subject between the California company and the international companies already supplying the European market may ultimately (if not immediately) lead to an amicable settlement and to a place being made for Bahrein and Saudi Arabian petroleum supplies.

Security of Oil Supplies in Wartime

Nations Without Adequate Production of Their Own Find Themselves at a Disadvantage in Relying Upon Imports of Crude Rather Than Finished Products. Flexibility Sacrificed by Limiting Demand to Crude Oil.

War or rumours of war immediately stimulate the demand for petroleum products. The Great War taught the world the fundamental importance of oil both in land and naval operations. Today it is more essential even than two decades ago. Whenever an international alarm is sounded, therefore, the nations hasten to accumulate supplies of oil in preference even to foodstuffs and other products which can hardly be classed as munitions but still are indispensable to the prosecution of modern warfare.

So much is this the case that even the present disturbance in Africa which Italy herself does not recognize as a real war but describes as a colonial expedition has sent a half dozen nations scurrying to build up stocks of motor fuel. Not only is Italy herself hastening to accumulate substantial quantities of gasoline and lubricants before the threatened closing in of economic sanctions, but other countries which are not directly involved in the present disturbance are following a similar course in fear of what may take place.

It is interesting to note that among these nations are some who have been active in the period since the World War in building up an internal refining industry in order, so it was claimed, to assure their independence in the matter of petroleum supplies. France is a most conspicuous example. In the past ten years France has moved consistently and rapidly in converting her position from an importer of petroleum products to that of an importer of crude. By taxation, by elaborate regulations and by a system of long term licenses for crude importations and short term permits for the admission of manufactured products France has forced the larger oil companies operating within her borders to build refineries there at a cost of milliards of francs. More than that, she has acquired a direct ownership in Near Eastern crude. All this has been done in the name of national security, in order to make sure that France in case of an emergency would be assured of ample petroleum supplies and in order that she might be independent of the great international oil companies. Yet what do we now see? France, with a refining capacity well above her actual needs, with the cherished Iraq crude still flowing from the Eastern Mediterranean to her ports, has been feverishly buying up gasoline in outside markets. The extent of the purchases above normal imports cannot be stated with exactitude but they are estimated in the oil trade to have amounted to well over 100,000 tons in the past two months and they are still continuing as this is written. Why? What has become of the national security that was to be assured by the construction of a large number of refineries in France? In point of fact France is not at war and she is striving desperately to avoid being forced into a position that may involve her in war. Why then the great anxiety to accumulate stocks of petroleum products beyond her normal requirements? Do the French authorities envisage the possibility that the flow of oil through the Mediterranean may be interrupted or that some of her refineries presently may be unable to obtain crude from their customary sources of supply? Presumably such is the case.

This is not to be construed as a criticism of France for developing a great domestic refining industry. There may have been, and doubtless were, certain advantages in the adoption of that policy. But the present situation exhibits the fallacy of the argument that the establishment of refining facilities will add to the security of a non-producing country in time of war or other emergency. Actually the contrary is the case and the nation without crude supplies within its own borders is handicapped in meeting such emergencies if it depends upon the importation of crude supplies rather than of finished products.

In wartime the normal relationship in the demand for various products is completely altered. The ability to vary purchases to meet these changed demands exists when a country imports the exact products which it requires in the quantities needed. A home refining industry, on the other hand, cannot alter the balance of its various products without a certain amount of delay, expense and even waste. The flexibility that is needed for prompt adaptation to changed conditions is lacking.

Another point that is important in considering the conditions that prevail when war exists or is threatened is that the importation of finished products economizes tanker tonnage because nothing has to be imported that is not needed for consumption. Even in peace time it is impossible for refineries in consuming countries to avoid producing certain products, such for example as fuel oil, in excess of domestic requirements. It is in fact impossible to find a crude oil which will give the refiner the exact balance of products which is ideal for the requirements of his home market.

If a nation is without command of the sea and has inadequate native supplies of oil, or perhaps no supplies whatever, the existence of a local refining industry can postpone only for a very short period the time when it will find itself on short rations in the event it enters into combat with a strong maritime power. If the sea ways cannot be kept open for the admission of finished products certainly a pathway cannot be maintained for the entrance of crude supplies.

It must be remembered also that refineries are built to operate on certain types of crude. War may force a country to change completely the source of its crude supplies. This factor is of no consequence to a country which imports finished products but it might disorganize the refining industry of a non-producing country operating refineries of its own.

If a country is purchasing finished products from a number of outside refiners every effort will be made by these companies to maintain or increase shipments regardless of any emergency that may arise. In a scramble for supplies such as takes place even on the first rumours of a possible large war it is impossible for refiner-marketers to take on new customers. It may be difficult if not impossible, therefore, for a country to change from the purchase of crude to the purchase of finished products under such conditions.

There is also the consideration, in the event of actual hostilities, that a refinery is a stationary and conspicuous object open to attack from the air while a tanker is mobile, can readily deviate from its accustomed course and is less open to destruction by bombing. The same consideration, of course, applies to hydrogenation plants for the production of oil synthetically from local supplies of coal, lignite, or similar materials.

As stated before this is not a criticism of French policy in building up a domestic refining industry. Far less is it an argument for the destruction of that industry as it now exists. The present situation does contain a lesson, however, for those countries without crude supplies which have been tempted to embark or to consider embarking upon the development of an internal refining industry in the belief that it will result in greater security in the matter of petroleum requirements in the event of war.

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Italy Pushing Forward Refinery Programme

ROME, NOVEMBER 10TH

So MUCH attention has been given by the newspaper press to the military operations in which Italy is engaged that a quite erroneous impression seems to have been created as to conditions within the country itself. Apparently the belief has been created among a large part of the general public in outside countries that the resources of Italian manufacturing plants are being devoted wholly to the production of armament and war supplies and that labour is engaged solely in such activities. This is so far from being the case that a visitor to the country who did not read the newspapers would hardly know that anything out of the ordinary was going on.

It is true that certain lines of business such as the construction of dwellings, apartment houses and office buildings have been partly or wholly suspended and that prices of gasoline and certain other products have been increased for the purpose of curtailing their use by private companies and individuals. The general industrial activity of the country has not been seriously affected and the oil refinery programme not at all.

Even so reliable a journal as WORLD PETROLEUM apparently has been misled into the common error as a note attached to an article in its October issue states that no further refinery construction is likely to be undertaken until the outcome of the Ethiopian affair is determined. On the contrary the government looks upon the carrying out of the oil programme as a measure of primary national importance. Instead of putting obstacles in the way of those who have received construction permits the authorities are urging concessionaires to proceed with all possible rapidity to the prosecution of their plans. There have even been intimations that in the case of some concession holders who are unwilling or financially unable to go ahead the government itself may take over some of these projects.

As regards the major construction projects that of Dicsa is already under way and it is understood that Aquilla is getting ready to begin construction. The questions that delayed the inception of Vacuum's reconstruction of its Benit plant have been settled and it is reported that work will shortly get under way.

Ample facilities are available for the fabrication of refinery equipment that can be made in Italian manufacturing establishments and there is no lack of labour to handle the task of erection. The one serious difficulty that presents itself is in assuring prompt shipment of special equipment that must be imported. Outside manufacturers naturally are reluctant to guarantee delivery in view of the talk of economic sanctions and the uncertainty created by such reports. While restrictions have been placed on the export of funds these do not apply to the payment for refinery equipment or other necessary purposes.

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Will U. S. Limit Oil Shipments to Italy?

While the State Department Is Swayed by the Desire to Enforce Peace in Europe and Avoid Entanglement Oil Companies Maintain that No Bar to Oil Trade Should be Raised.

OIL HAS been mentioned with increasing frequency in the past month as one of the materials which should be brought within the meaning of the limitation of exports implied in recent neutrality legislation. Despite the fact that Italy formally maintains the status of a friendly nation and so far oil has not been construed as munitions or armaments, the United States State Department has intimated in a number of ways recently that the international oil companies should avoid a voluminous oil trade with Italy.

The oil companies in the United States which have in the past carried on oil trade with Italy assume the attitude that there is nothing in the present situation to cause them to curtail their function of supplying petroleum and products to a country that is formally on good terms with the United States, and with whom they have been doing business in some cases for more than 40 years.

How long the State Department will continue to permit unlimited exports of petroleum to Italy is at the moment a very much unanswered question.

Recently, it was rumored that suggestions had come from Europe urging the United States to place an embargo on oil shipments to both of the belligerent na-

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Petroleum supplies are essential to the Italian campaign in Ethiopia: fueling Italian planes for an air raid on the Southern front in Ethiopia.

© Wide World

A barrel of oil being unloaded in Ethiopia at an Italian army post.

Petroleum plays an important part in pushing the Italian advance into Ethiopia.

© Wide World

tions and thereby avoid the formality of adjudging Italy the agressor nation. Such action, however, is considered of too transparent a purpose even for diplomatic use, in view of the very nominal trade in oil that is carried on between the United States and Ethiopia. No confirmation of the rumored source of this suggestion was possible.

On the record, the United States government, through President Roosevelt and Secretary of State Hull, want no traffic with belligerents. Publicly spoken pronouncements in substance are:

"Trade with Italy at your own risk; the United States must maintain neutrality. We hope that no American company will violate the spirit of the neutrality law enacted by the last Congress."

Off the record, there are inside intimations that the Administration really hopes that American oil companies will not engage in voluminous business with Italy, but is uncertain as to what it would do or whether it should embargo shipments.

Several strong indications have come from high sources that the country will, if it decides it is necessary in the interest of neutrality and to maintain peace, lay down a flat prohibition against petroleum exports, classifying them as instruments of war.

The process of policy-development, however, had not, as this is written, advanced sufficiently to warrant any of the most responsible Federal officials making a definite prediction that oil and its products would be put on the contraband list, or would not be put on that list.

Several companies are understood, in an informal manner to have approached the State Department to attempt to obtain a declaration of policy, only to be told that the United States felt that trade with Italy was the risk of the shipper.

In event oil is placed on the contraband list, shipments for export can be made only under license from the government. This procedure is provided for in the neutrality act and in the first Presidential order issued thereunder, an action of some weeks back in which munitions and weapons, planes and engines, tanks and other first-line implements of war were embargoed.

While speculation over what the government might finally do continued in the American oil industry throughout the country, the Italian government was seeking to buy East Texas crude, from 36 deg. to 40 deg., f.o.b., any Gulf Coast port, under hatch. Authoritative sources here indicated that approximately 50,000,000 bbl. was being sought, with the purchase offer understood to provide for cash payment on delivery to tanker, at the rate of 1,500,000 bbl. a month over three years.

Indicative of the interest with which Italy's fuel needs and search for substitutes are followed by this country, the

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Oil burning British man-of-war at the entrance of the Suez Canal through which many Italian transports bound for the African campaign have passed.

Department of Commerce recently released an extensive report with respect to the use of gasogenes and the requirement of a Cabinet Council decree that all buses and trucks must be powered by such fuels by not later than 1937.

A sharp increase in the sales tax rates covering petroleum and its products, put into effect by Italy on October 1, was interpreted here to mean that the Italian government was seeking to discourage the use of imported crude and products for two reasons:

1. To increase the use of wood-base and beet alcohol fuels for domestic fuel sufficiency, and,

2. To discourage the use of petroleum fuels in civilian activities so as to leave more of the available meager supply free for military purposes.

The new rates, as reported to the Department of Commerce by Commercial Attaché, Charles A. Livengood at Rome, follow, with the old rates in parentheses:

Kerosene, 195 lire per 100 kilos (150); crude petroleum other than for refining or direct use as fuel, 125 (68); white oils for transformers, 130 (75); lubricating oils, 112 (55); mineral oils, other than gasoline, kerosene, etc., 210 (102); residues having a density of more than 0.880, 50 (32); 0.850 to 0.880, 110 (73); other residues, 125 (68).

Increased imports were shown by the Department to have gone to Italy during the first six months in 1935, as compared with both 1934 and 1933, with the United States supplying about 72.7 percent of the lubricating oils, but comparatively little of the other products, and crude, with the percentages of Italian consumption supplied by the United States during the six-month period, as follows:

Kerosene, 10.3 percent; gasoline, 6.6 percent, and crude and residues, 4.5 percent.

Oil Shipments into Italy from the United States During the First Half of This Year†

Product	Jan. 1–June 30, 1935	Jan. 1–June 30, 1934	Jan. 1–June 30, 1933
	(Measured in quintals*)		
Crude	1,106,821	739,990	706,442
Gasoline	1,767,789	1,457,445	1,275,959
Fuel Oil	6,127,691	5,766,085	5,447,757
Kerosene	568,038	527,652	532,524
Lubricants	376,891	295,366	340,992

* Conversion table: 10 quintals per metric ton.

† Official import figures released by the U. S. Department of Commerce.

It is of interest to note that oil was once on the list of contraband articles as prepared for the approval of the President, but was not on the list when it was announced some weeks back. At that time, it was understood unofficially in Washington that oil was excluded along with other similar commodities because it was felt wiser strategy to withhold such drastic action until the Italo-Ethiopian conflict became a general European war. The grounds were strictly economic. However, the Administration appears to be sincere in its public pronouncements that trade with Italy is at the risk of the shipper and that the United States Navy will not intervene to protect carriers.

Some of the remarkable light Italian tanks on the rough terrain of Ethiopia.

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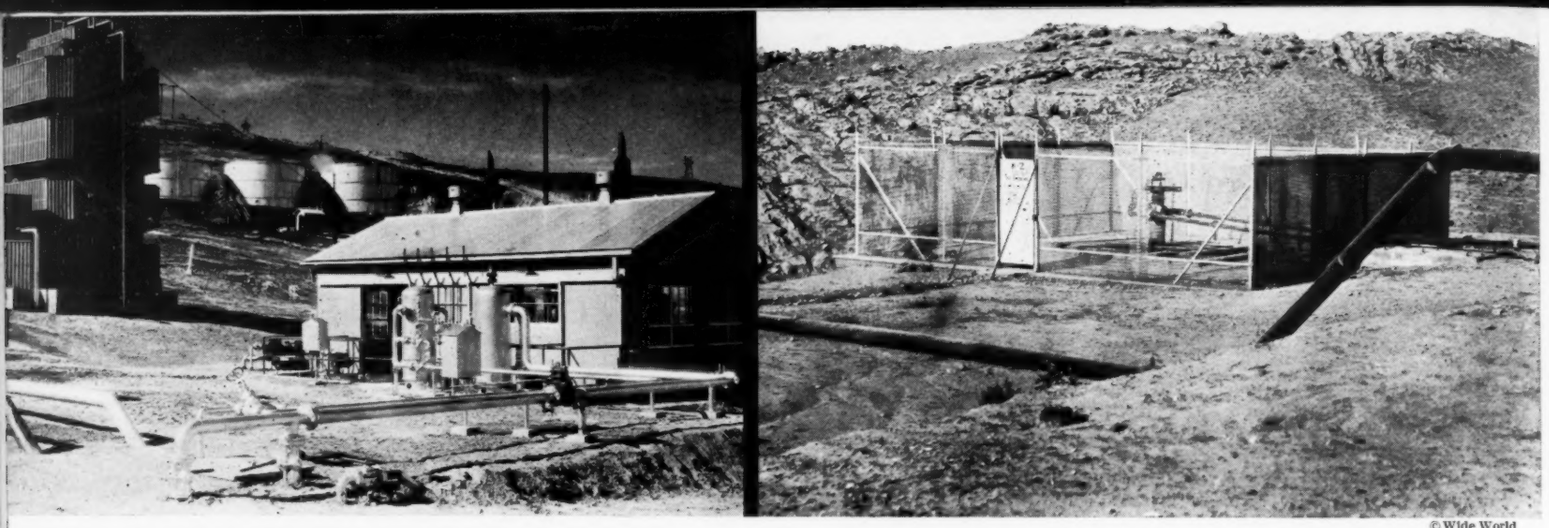

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U. S. Relinquishing Leading Export Position

Past Five Years Show Marked Changes in Flow of Petroleum in International Trade With Consumption Increasing, New Countries Entering the Picture and Domestic Refining Growing.

APACE with the steady expansion of refining facilities in the United States, the international increase of refinery units and crude supplies since 1930 shows that several important trends are progressing in petroleum over the world.

In brief, they might be summed up for a hurried look as:

1. Increased consumption of crude in those countries dependent upon outside sources of supply, a demand which appears to have been answered by producing nations located nearby.

2. An adjustment of the movements of crude between companies to meet economic conditions.

3. The opening of new sources of supply, such as Iraq, which may decrease imports by France and Italy from other countries, and leave more products and less crude to go from Iran toward England.

4. The trend toward processing nationalization in Japan, France, and other countries, to the extent that each hopes to become more nearly self-sufficient as a processing nation, although still largely dependent upon outside and non-colonial sources for raw supplies.

5. The almost frantic search of Italy and Japan for power fuels within territory they control, possess or can seize.

6. A turn in Germany and England to processing oil and motor fuels from coal, with Germany making considerably the more progress to date.

7. A distinct showing that while production of shale oils in Estonia, South Africa, and Manchuria may have increased, it is not likely to be of sufficient volume for some years to alter the generally prevailing relations between petroleum importing and crude producing nations.

8. An indication here and there, such as is evidenced in reciprocal trade agreements of the type being negotiated by the United States, that artificial barriers such as tariffs and taxes, now temporarily serving as obstacles, will not be permanent.

Data covering 1930, 1933 and 1934, compiled by WORLD PETROLEUM through its Washington office, and summed up in the accompanying table, clearly chart the shifts and trends as it may best be done at this time, bearing in mind that 1931 and 1932 both were such abnormal years that statistics concerning them are of little value in attempting to measure new alignments in the international field.

Briefly, a careful survey indicates that of the seven major world powers, only the United States and Russia have enough crude within their territorial confines to meet their own needs. France and the United Kingdom probably could, by drawing upon colonial possessions or protectorates, obtain enough potential to take care of their requirements.

Thus the three most belligerent powers, Japan, Italy and Germany, find themselves in the unfortunate position of small domestic output, but increasing demand. Germany is moving to offset its needs with carbonization and hydrogenation of coal. Italy and Japan are seeking foreign fields. Each appears doomed to remain, at least for the time being, dependent upon areas over which they have little, if any, political authority.

In the continental scheme of things, only two nations, Roumania and Russia, have crude to spare for export. Here, a better world price for products, better foreign exchange conditions, and fewer bartering transactions indicates that these are likely to refine more petroleum at home.

To Russia, an important factor has developed in that crude is at least one substance owned by Russia that other nations want, enabling her to enjoy a good exchange position, and making Russian crude exports, although only two to three percent of Russian production, a factor of great moment in Soviet economic affairs, as a medium of ready cash exchange.

But, a complication arises in data showing that internal use of petroleum products is climbing steadily in the Soviet Union and the exportation of too large quantities might result in a scarcity at home. That Russia recognizes this situation may be seen in looking at the increase

© Aerial Survey

On this and the facing page are pictured some of the world's important sources of export oil. The illustration at the extreme left on the opposite page shows Kettleman Hills in California; the illustration on the right on the opposite page shows a completed well in Iraq closed in until the world needs its reserve oil; the illustration above shows the oil camp at Talara, Peru, on the edge of the desert, whence oil is shipped to the world's markets.

of Russian refining facilities from a daily capacity of 352,000 bbl. in 1930 to around 1,000,000 bbl. now, while crude production went up 28 percent in the same period.

Roumania gives an indication of a desire to keep her crude at home and send refined products into foreign fields, with an apparent aversion to putting crude in current agreements, which is matched by a willingness to substitute refined oils for required imports, or for disposing of unfavorable trade balances.

New countries appeared as sources of supply for France as an aftermath to the embarking by that republic upon a policy of refining at home, sped along by dutyless imports and a differential between import duties and excise taxes on refined products.

While the French refining plant capacity was growing to 138,000 bbl. daily in 1934, as compared with 11,250 bbl. in 1930, crude imports rose from 3,164,000 bbl. in 1930 to 19,178,000 bbl. in 1933 and had jumped to 30,638,000 bbl. in 1934. Right along with this development, the United States climbed to the top as the supplying nation, accounting for 41 percent in 1933 as compared with none in 1930, a year in which France got 46 percent from Venezuela and a like amount from Iran. Both these latter had dropped in 1933, Venezuela supplying only 26 percent and Iran, less than 10 percent. Twenty-one percent of the 1933 store came from Peru, Russia, Netherlands India, Roumania and Ecuador, none of which can be found in the 1930 records. About 2,000,000 bbl. of new production from Iraq was the only change of consequence in the origin of imports by France in 1934.

England, busy experimenting with coal fuel derivatives, seems to be unpersuaded that it would be advisable to expand crude refining facilities so as to substitute products processed at home for imports of refined items. The capacity of United Kingdom refineries was about the same from 1930 through 1934, and the 13,500,000 bbl. of crude imported in 1934 were only slightly larger than the 1930 imports.

Mexico appeared to have moved into the English market for crude in the period, supplying nearly twice as much in 1934 as in 1930, while Iran's share fell off from 74 percent to 46 percent. Venezuela also lost, with Iraq oil making available upward of 400,000 bbl. from a new reserve.

Italy, with domestic production negligible, seems to be concentrating on building up supplies from shales in Italy, wood and alcohol fuel combinations, and through the development of concessions in Iraq (Mosul Oil Fields, Ltd. in which Italy has recently increased her holdings) and Albania, along with building up domestic refining plants. While Italian imports in 1934 amounted to around 1,000,000 bbl. and represented a slight gain over 1933, they constituted an increase of approximately 50 percent over 1930.

Germany, well ahead of other nations in the development of substitutes for petroleum—but not its products—appeared in the period covered to have gone a long way toward meeting her fuel necessities by extracting oil from coal. Importation of finished products and semi-refined oils, and crude and crude produced at home, satisfied the rest of her needs.

A thirty percent increase in German crude production was noted in the period, with the 1934 figure of 2,200,000 bbl. making a total that, for the first time, ex-

The Flow of Crude Petroleum in International Trade

PRINCIPAL EXPORTING COUNTRIES		IMPORTING COUNTRIES																			TOTAL EXPORTS
		NETHERLAND WEST INDIES	UNITED STATES	CANADA	FRANCE	JAPAN	UNITED KINGDOM	AUSTRALIA	GERMANY	HUNGARY	AUSTRIA	ARGENTINA	ITALY	NETHERLANDS	CZEKSLOVAKIA	BELGIUM	JUGOSLAVIA	SWEDEN	FINLAND	EQUADOR	
VENEZUELA	1930	106,245	25,299	3,774	1,452		2,066				e							50		32	135,305
	1933	93,474	17,218	1,579	4,975		614														112,815
	1934	107,473	25,305	956	5,353		671		182												131,458
UNITED STATES	1930			19,774			164	39	60	141	39	155	112					299	18	25	23,704
	1933			19,693	7,838	8,218	26	2,636							78					79	36,584
	1934			22,743	9,171	11,812	169	2,189			7		169		551	256					41,127
COLOMBIA	1930		14,204	3,268	276							196	193								19,113
	1933		7,688	2,585	656								442			60					11,806
	1934	634	4,339	4,287	2,275								446		88	60					16,477
MEXICO	1930		10,093						1,364			85		1,588				48			12,714
	1933		5,866				1,734		1,964					515							11,085
	1934		5,886				3,263		1,755					685							11,798
IRAN	1930				1,436		9,680	677													11,778
	1933				1,604		6,340	158													9,334
	1934				3,021		6,186	791													10,959
PERU	1929	69	1,281	2,100								3,358									7,630
	1933		19	2,637	582		2,134														6,936
	1934			2,517	3,387		2,357														9,459
U.S.S.R.	1930									117			369		795			18	36		1,649
	1933				608	2,079				81			209		573						5,905
	1934				1,400	1,691							51		133						3,901
NETHERLAND INDIA	1930							2,773													6,005
	1933				2,133	1,547		2,166													3,455
	1934				2,291	1,864		4,487													4,042
IRAQ	1930																				
	1933																				
	1934				1,953		383														2,336
ECUADOR	1930		1,215																		1,128
	1933		858		446											82					943
	1934		80		761		186									158					1,206
RUMANIA	1930									1,255	746						996		28		486
	1933				171			207		909	1,387		295		10	29	679				1,647
	1934				640		6	141		1,203	1,158		335		68	45	600				1,919
TRINIDAD	1930		228				699														3,382
	1933		241	39			369														1,170
	1934		23	135			314														470
BRITISH BORNEO	1930																				871
	1933					1,005		118													
	1934					924		43													
OTHER	1930	34	9,808				380		910						229	3	7	411	34	65	
	1933		34	735	265	369									46	1	2			19	
	1934		138			354	97							299	8	95	31			97	
TOTAL IMPORTS	1930	106,348	62,129	28,916	3,164	10,391	13,171	3,489	2,334	1,513	785	3,795	674	1,588	1,024	3	1,003	826	116	122	
	1933	93,474	31,924	27,268	19,178	15,155	11,217	5,285	1,964	990	1,387	1,089	946	515	707	172	681	397	96	98	
	1934	108,107	35,772	30,638	30,252	18,309	13,632	7,651	1,937	1,203	1,165	1,152	1,001	984	848	604	601	438	131	97	

Figures in the above chart are given in thousands of U. S. Barrels. As details of imports, country by country, from a given exporting country rarely total the same as exports from the given exporting country, no effort has been made to effect even approximate reconciliation.

ceeded imports. Mexico supplied virtually all the crude imported into Germany, supplying 1,364,000 bbl. in 1930, 1,964,000 bbl. in 1933 and 1,755,000 bbl. in 1934.

Since there was about a 300 percent increase in refining capacity during the same period, a figure far above the increased consumption of crude petroleum in Germany, the records indicate that plants for processing oils from coal and treating semi-finished products took over the difference.

The substance of the European situation, and the material factor for the United States oil industry, is that the combination of refine-at-home and substitute development, along with the search for sources of supply in colonial or concession areas by European powers, probably will mean:

The relinquishment by the United States of its position as chief world supplier and as the second largest importer in the world, a position shown in the figures identifying crude imports from the Latin American countries.

American imports of petroleum, most of which were inferior to domestic crude in recoverability of high grade products, were roughly twice the volume of exports until 1932. Since then exports have exceeded imports, attributable in part to the clamor of domestic producers to Washington for a high tariff or embargo, and to the Petroleum Code, under which imports were limited.

The largest source is Venezuela, which supplied 25,299,000 bbl. or 41 percent of the 62,129,000 bbl. brought in during 1930. Colombia, Mexico, Peru, Ecuador and Trinidad followed with 14,024,000 bbl.; 10,093,000 bbl.; 1,281,000 bbl.; 1,215,000 bbl. and 228,000 bbl. Nearly 10,000,000 bbl. were added by re-exports from Netherlands West Indies.

Excess domestic production and accumulated stocks are reflected in the 1933 and 1934 import figures, as well as the NRA code and its limitations and the 21 cents a barrel duty placed on foreign crudes. Imports in 1933 aggregated 31,924,000 bbl. or slightly more than half the 1930 total, but climbed 12 percent to 35,772,000 bbl. in 1934.

Canada, enjoying a high per capita consumption of products, seems to have done comparatively little toward increasing her refinery capacity, with a daily capacity of only some 48,000 bbl. more in 1934 than in 1930, importing around 30,000,000 bbl. of crude. About 70 percent is supplied by the United States.

In the other parts of the Western Hemisphere, which seems to be well supplied with reserves for the time being, Venezuela maintains its third ranking in point of production in the world. Mexico remains among the important producers with a production of about one-fourth of her one-time peak. The respective positions of these and the other Latin-American producers, Colombia, Peru, Argentina, Trinidad and Ecuador, can be readily obtained from the accompanying table.

Oil being imported into one of the world's important markets; the tank farm of Rhenania-Ossag, at Hamburg, Germany.

Venezuela retains only a small bit for home refining, a figure comparatively unchanged in the five years 1930–1934, exporting 99 percent in 1930 and 96 in 1934. Peru and Ecuador hold 35 to 43 percent of their crude for domestic uses; Mexico, about 70; Colombia is in the same bracket with Venezuela, and Argentina is supplementing domestic output with 1,000,000 bbl. of imports a year.

In Latin America, the development of refining facilities has progressed comparatively little. None of the other nations in the republics below the equator has uncovered any reserves of consequence, although further exploration and advanced geological prospecting may disclose new and prolific sources of supply.

Turning to the Asiatic picture, and to the lesser European powers, one finds:

Japanese production of 1,800,000 bbl. to 2,000,000 bbl. a year is less than a fifth of the amount believed available for 1934 consumption in Nippon. Crude imports, on which really accurate data are not available, are estimated at around 8,000,000 bbl. in 1934 and 6,500,000 bbl. in 1933. Imports of crude and fuel, which are combined in the statistics at hand, show a gain of 4,770,000 bbl. in 1933 over 1930, and a rise of 3,150,000 bbl. more in 1934.

Japan's eagerness to develop adequate stores of crude is better understood by checking on the sources of its imports, with 54 percent from the United States in 1933 and 64 in 1934, while imports from other areas in the same years: Netherlands India, 10 and 10; British Borneo, 6 and 5; Sakhalin, 13 and 9. The Fushan shale refinery turned out 354,000 bbl. of shale oil in 1934, while the processing of shale from Manchurian beds is expected to provide a substantial share of Japanese naval requirements in the immediate future.

Burmah, Netherlands India, and British Borneo, if Iraq and Iran are omitted from the Asiatic picture since they pour into Europe, account for the rest of the Asiatic oil. Oil in these areas is processed at the source, for the most part, shown by the 1934 figures: 90 percent in Netherlands India; all in British India, and about 90 percent in British Borneo. No crude is found in Australia and New Zealand, which import 7,500,000 bbl. and 1,000,000 bbl. yearly, duty free, to encourage domestic refining.

Poland produced about 10,500,000 bbl. in 1934, virtually all of it refined in the country. Austria, Hungary, Czechoslovakia and the Netherlands each processed about 1,000,000 bbl. a year, the details of which are set forth in the table. About two-thirds of Egypt's annual processing of some 2,000,000 barrels of crude came from Egyptian fields.

Daily refining capacity in Poland remained around 7,000 bbl. during the period; increased from 2,000 bbl. to 9,000 bbl. in Belgium; 8,000 bbl. to 11,000 bbl. in Czechoslovakia; 8,000 bbl. to 9,000 bbl. in Hungary; 3,000 bbl. to 4,000 bbl. in Yugoslavia and declined approximately 2,000 bbl. in Austria.

Method of Determining Japanese Quotas

In Arriving at Allocation of the Japanese Market for 1935 the Question of the Amount to Be Given Importers and Refiners Arose as It Will in 1936.

By W. Harvey Clarke

TOKYO, OCTOBER 1935

HAVING the primary intention of fostering volatile oil production within the Japanese Empire, the Ministry for Commerce and Industry on December 27, 1934, notified all oil importers and refiners in Japan of the first oil sales quotas to be enforced, since a new oil industry committee had been appointed under provisions of the recently promulgated Oil Business Law of Japan. These sales quotas, effective during the current year 1935, are of general interest due to the fact that certain countries protested restrictions imposed by the new oil law upon international oil concerns operating within the empire.

When the various importers and refiners of oil in Japan were notified of their respective quotas for the current year, the Commerce and Industry Ministry did not announce publicly the specific volume allotted to each of them. The Ministry did announce, however, total volumes classified according to varieties of oil, as given in the accompanying Table 1.

Table 1

Japanese Oil Sales Quotas

(In U. S. gallons: 000 omitted)

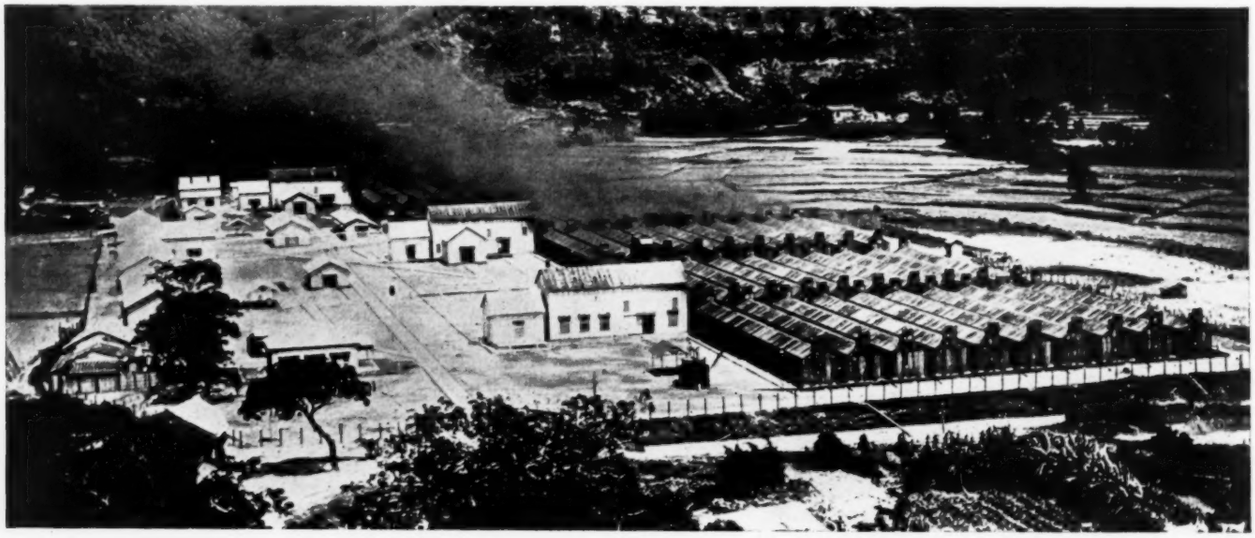
	To be sold by Importers	Refiners	Total Volume
Volatile oil	149,688	153,912	303,600
Illuminating oil	14,916	22,044	36,960
Light oil	2,376	50,424	52,800
Machine oil	9,900	66,660	76,560
Heavy oil	281,688	48,312	330,000

By taking the oil quotas for the last half of 1934, as were announced in August of the same year, the Ministry was well able to estimate the relative status of refiners in determining their new quotas; and by ascertaining the different capacities of volatile oil refineries, a fixed sales quota was reached for each company concerned. In cases of illuminating, light, machine and heavy oils, the government resorted to approving the production volume submitted by each individual refiner.

In determining the current year's quotas, particular attention was given to the relation between different kinds of oil, according to which findings the sales volumes of all grades were set. The volatile oil output of large refiners was regarded as a primary factor in determining their quotas; but with small refiners machine oil production was taken as a basis. Natural increase in production was fairly well distributed among the various refiners in Japan.

The Japanese government's tentative policy of withholding public announcement of the current quotas for importers and refiners at the time they were notified of them aroused the criticism of some observers as manifesting the state's non-recognition of fundamental control economics. The secrecy in which the quotas were held, some declared, tended to weaken the Japanese consumers' attention to the current activities of oil men. The government was further criticized for its delay until late in December in notifying importers and refiners of their respective quotas, thus allowing them little time in which to prepare for observance of the new quotas.

As importers' and refiners' detailed plans of operation for 1935 were supposed to be in possession of the Ministry by the end of September, 1934, ninety days was considered an unnecessarily long period for the government to require in deciding



Carbon black factory in Shinchikushu, Taiwan, Japan.

on quotas. One cause for delay was the failure of international companies in Japan to submit their data to the Ministry within the prescribed time, their excuse having been that a concerted protest by them concerning oil control in Japan, as coming under the new law, had not been settled. These firms did not turn in reports until late in November, 1934, thereby making it impossible for the newly appointed oil committee to function for nearly 60 days after they should have been in session.

Volatile oil is the outstanding item represented in Japanese oil sales quotas, and the nation's steadfast policy regarding oil is to promote volatile oil production in the empire's refineries. The sale of volatile oil throughout Japan exceeds that of either illuminating, light or machine oil. Its sales volume closely approaches that of heavy oil, but the price of the latter is about one-third that of volatile oil.

Total volatile oil sales during 1934 are estimated at 1,000,000 kiloliters (264,000,000 U.S. gal.) by the Ministry for Commerce and Industry, and the natural increase during the current year is set at 150,000 kiloliters (39,600,000 U. S. gal.), a rise of 15 percent. For this year 1,000,000 kiloliters (264,000,000 U. S. gal.) were distributed among importers and refiners upon the basis of last year's distribution; but the natural increase estimated at 150,000 kiloliters (39,600,000 U. S. gal.) was distributed by taking into consideration equipment not being operated as well as projected plant increases, 45,000 kiloliters (11,880,000 U. S. gal.) of this total going to importers and 105,000 kiloliters (27,720,000 U. S. gal.) to refiners. The 1935 quotas for importers and refiners, therefore, were determined as indicated in Table 2.

Table 2

	Importers %	Refiners %
Volatile oil	49.30	50.70
Illuminating oil	40.36	59.64
Light oil	4.50	95.50
Machine oil	12.93	87.07
Heavy oil	85.59	14.41

The 1935 quotas set by the Japanese government for international firms operating in Japan include their former sales volumes and a part of their natural increase in sales, in respecting their rights; but the government's attitude toward distribution of this natural increase is not defined clearly. Although it appears that the current year's natural increase is not being monopolized by refiners, yet it is unknown whether or not some of the natural increase will permanently go to importers. Japanese refiners expressed a desire to have all of the natural increase,

One of Japan's domestic sources of crude oil; the Taiwan oilfield of the Nippon Oil Company.

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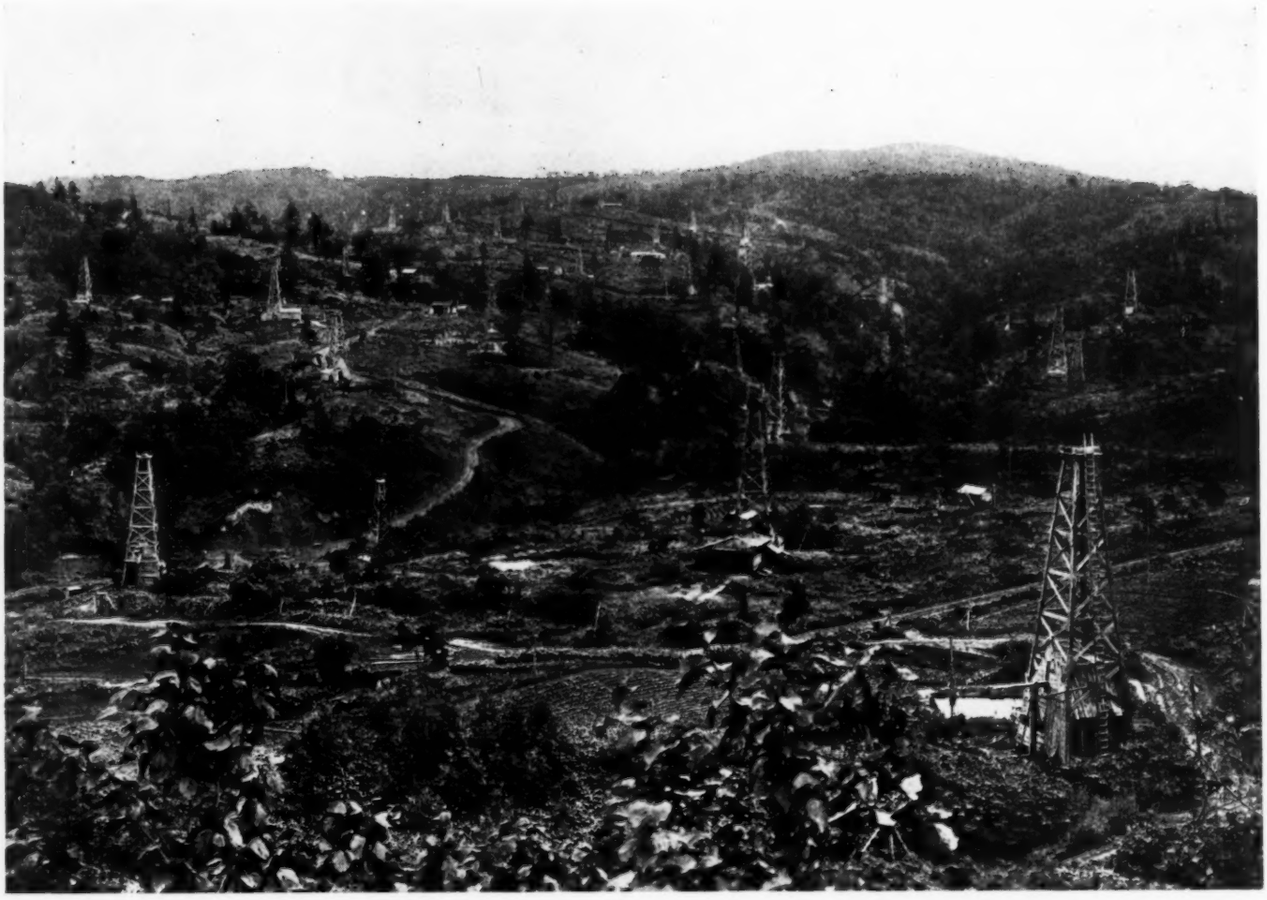
Akita refinery at the town of Tsuchizaki in the Akita Prefecture with part of the large storage now required in the foreground.



A second domestic source of Japanese oil; Ishikari oilfield, Hokkaido Island.

as they had had in the quotas for the last half of 1934; but the government saw fit to give international concerns a part of it. Japan's crude oil resources being strictly limited, her chief sources of supply are abroad. For this reason the government realizes the advantage of playing fair with international firms, and therefore is striving to avoid as much as possible disagreements between domestic and other oil companies while concurrently fostering the development and growth of the empire's refining industry.

Japanese factory statistics show that in 1929 there were 39 oil refineries employing 1,429 workers, 44 refineries having 1,397 employes in 1930 and in 1932 the number had jumped to 53 refineries with 1,748 employes. A recent report for November, 1934, gives a total of 66 refineries in Japan. The volume of oil refined in Japan increased between the years 1929 and 1933, as indicated in Table 3:

In 1929 the domestic output of volatile oil represented only 40 percent of total consumption, but by 1933 it had risen to 46 percent.

Of the 66 refineries in Japan today, 12 large ones, each having annual capacities exceeding 50,000 kiloliters (13,250,000 U. S. gal.), control approximately 80 percent of total domestic consumption. Most of the volatile oil produced in Japan comes from these larger refineries.

With the new oil business law requiring the maintenance of definitely prescribed refining capacities, the smaller refineries in Japan will find it necessary to augment their plant equipment, or run the risk of being absorbed eventually by their financially stronger competitors. Broad-minded Japanese observers are of the opinion that plans to establish oil refineries on Japanese soil with the aid of outside capital should not be hindered, but rather welcomed, in as much as Japan has no tangible guarantee of a continued supply of crude oil because of her domestic oil resources being definitely limited.

Meanwhile the necessity of maintaining the excessive storage capacity required by the government is a strong factor in discouraging the investment of capital in the Japanese refining industry.

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Table 3

Increase in Volume of Oil Refined in Japan 1929–1933

(U. S. Gallons: 000 omitted)

	1929	1930	1931	1932	1933
Volatile oil	49,826,568	56,192,928	77,473,704	72,184,992	103,703,688
Illuminating oil	13,633,224	15,976,224	16,255,800	21,755,184	21,076,440
Light oil	63,672,696	59,886,816	50,769,840	58,533,552	51,976,320
Machine oil	36,632,112	45,259,632	43,386,552	43,429,584	53,099,904
Heavy oil	10,449,648	12,769,680	21,092,280	18,822,672	33,696,168

Government Policy Causes Speculation

Oil Legislation Before Coming Session of Congress Expected to Receive Support From Ickes—Petroleum Administration Prepares Results of Its Survey.

By Don Kirkley

WASHINGTON, NOV. 22.

CHRISTMAS, Congress and European entanglements arrive together with December to plague Washington, beginning to stir from its Summer and Fall somnolence into signs of awakening for the Winter's excitement of the national legislative forensics.

Christmas is more easily disposed of in the Washington outlook than its companion, Congress, which convenes January 3, and which has oil legislation on the calendar of the House, awaiting consideration when members get around to taking up the calendar.

Thereon rests the Cole bill, espoused by Rep. William P. Cole, Jr. of Maryland, chairman of the Special House Oil Committee, and providing for federal advisory allocation of production, trade agreements, and a five-man Petroleum Administrative Board as a supplement to the Interstate Compact program now being carried on.

Cole intends to press his bill for consideration. Support for oil legislation may be expected from Secretary of the Interior Harold L. Ickes. Tacit support may come from the President immediately, followed by active support from the White House in a few weeks after the session begins. The latter is a development that must await other developments, primarily the reaction to the effort now being made to revive NRA in some form or other.

NRA Administrator Berry, successor to the five-man board that succeeded the colorful General Hugh Johnson in directing the National Recovery Administration, will meet early in December with as many tycoons as answer his invitation to 5,000 to gather with him around the conference table in a series of discussions during the month to decide whether NRA should be extended after it expires in April, and if so, along what lines.

Coincident with this development along the general business front there came the dismantling of the Petroleum Administration, whose employees have been advised that they should find other jobs by January 1, although a scant handful of some 15 or 20 have not been so notified and presumably will stay until the Board dies with the expiration of the Recovery Act in April.

The Petroleum Administration spent November seeking to put into shape for issuance late in December—along with the arrival of members of Congress—the results of its survey of conditions in the industry before, during and after the code. The findings will be fodder for the campaign for legislation, and probably will include a reply to the address by Axtell J. Byles, President of the American Petroleum Institute, in that organization's annual meeting, in which Byles sharply rapped the "scarcity of oil" calamity howlers. The reply is expected to take the form of a scientific analysis of petroleum reserves in this country and where they are, and will be intended to show that there is far less oil than Mr. Byles' address indicates.

Another federal agency found during November that regulation of oil and gas production has its difficulties. The Geological Survey and the Land Office, administering the new mineral leasing law which applies to all oil and gas discoveries on federal lands, found that the provision for unit operations delayed action.

Several hundred plans have been proposed by various companies interested in as many fields, but only a half dozen or so have actually cleared the Survey. The difficulty, the Survey insists, is that it is too short-staffed to get the plans out in time. The companies contend that the Survey is trying to get a minimum of 30 percent royalty payment to the United States government, as opposed to an average of around 14 percent under the old leasing system.

One other important oil issue neared a showdown in Washington as November ended: a decision by the Department of Justice on whether to prosecute several major companies on charges of violating the anti-trust laws through pegging prices, exclusive dealer contracts and unfair credit practices. While the Department may not make a decision in December, it hopes to, and present indications are that the companies will be prosecuted if more substantial evidence than has previously been supplied is found in field investigations being completed by agents of the Department of Justice in the eight Middle Western States including and adjoining Wisconsin and Minnesota.

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Americans in France

AMERICANS IN FRANCE—A Directory—1935 (published annually by the American Chamber of Commerce in France. Prices: cloth bound 50 francs, leather bound 65 francs).

This is an attractively bound volume dealing with Franco-American business, etc., and contains about 550 pages of information relating to American firms in France, French representatives of American concerns, American organizations in that country, American residents and a quantity of general information. The business section is classified by trades as well as alphabetically. The whole book is very well cross-indexed and a number of thumb-indices are provided for handy reference.

British Oil Imports

THE rising trend of British oil imports was sharply checked in October, apparently as a result of the incidence of tanker arrivals.

British Oil Imports by Products

	October 1935	10 months to October 31, 1935	10 months to October 31, 1934
Lamp oil	443,371	4,269,915	5,223,887
Motor spirit	2,201,742	30,094,483	27,040,200
Lubricating oil	259,226	2,387,881	2,545,055
Gas oil	198,173	2,469,233	3,240,260
Fuel oil	1,443,800	15,841,172	15,271,371
Other sorts	51,286	395,825	526,542
Total products	4,597,600	55,458,514	53,847,315
Crude	1,289,343	12,337,029	11,451,514
Total imports	5,886,943	67,795,543	65,298,829

British Shares Reflect Improved Outlook

Expanding Demand for Petroleum Products in England and Better Company Returns Coupled With Strengthening of U. S. Price Structure Have Improved Oil Share Quotations.

AFTER remaining out of the picture for several months, the London market for oil shares has recently been returning to favour, although the advance in prices has naturally been interrupted many times by the political uncertainties, both at home and abroad, recently restraining all activity on the London Stock Exchange. Some of the leading shares achieved new high levels for the current year, and the rise may be attributed to three main factors—the good results revealed in recent oil company announcements, the expanding demand for motor spirit and other products in Britain, and definite signs of a strengthening of the price structure in the United States.

Recent good oil results have included the rise in Trinidad Leaseholds profits from £213,509 in 1933–34 to £306,610 for the year to June 30, 1935, with an increase in the dividend from 12½ percent to 17½ percent. The report stated that sales and realisation prices had both shown improvement, and shareholders were informed at the annual meeting that the current year's business was developing satisfactorily. Maintenance of the Venezuelan Consolidated interim dividend at 1s. per share was another encouraging development. This company made a return of capital, to the extent of 6s. 8d. per share, a few months ago, thereby reducing its former £1 shares to a nominal value of 13s. 4d., the interim distribution thus representing a percentage rate of 7½, compared with 5 percent last year. This was interpreted in the market as a sign of increasing prosperity within the Royal Dutch-Shell group, an impression which was considerably strengthened when Shell Union announced a big increase in earnings for the September quarter. Circumstances therefore provided ample grounds for market discussion of the possibility of a resumption of interim dividends this year by the two central members of the group, as well as by other major companies whose shares are listed in London.

There is no gainsaying the improvement shown in the results announced by British oil companies, and the current improvement in the British distributing market is also indicated by a comparison of consumption and prices between this year and last. Trends in the British demand for five major products are illustrated in the accompanying table, setting out percentage changes in imports and consumption this year as compared with 1934, the figures taken covering the first eight months.

Trend in British Oil Demand

(Eight months to August 31—1934–1935)

	Imports	Released for Consumption
	Percentage change	Percentage change
Kerosene	−19.5	− 1.9
Motor spirit	+13.0	+ 5.6
Lubricating oil	− 7.4	+ 0.8
Gas oil	−30.1	− 5.5
Fuel oil	+ 8.6	+11.3

Discrepancies shown between the percentage changes in imports and those in consumption must be attributed to additions to and withdrawals from stock, rather than to changes in the direction of refining. In the case of kerosene, for example, several consecutive weeks of mild weather at the beginning of this year brought about a pronounced decline in the demand for this product, and as a consequence, importers were left with relatively heavy stocks during the summer months. Shipments during 1935 have therefore been relatively small, although consumption, which fell away heavily against 1934 during the first quarter, has since practically recovered.

While British consumption of kerosene and gas oil were both below last year's figures for the first eight months, the market absorbed larger quantities of other products, including motor spirit and fuel oil, and as these are by far the largest individual items in the demand, consumption of all products has increased by approximately five percent.

Concurrently with this increase, selling values have been very steady, with a tendency towards improvement, and the conditions under which distributors have operated have represented a definite advance on those prevailing a year or so ago. To this extent the rising tendency of oil share values on the Stock Exchange is justified by the immediate outlook for British distribution. Nevertheless, it would be dangerous to take an equally favourable view of prospects over a long period until the American oil position has been completely rectified. While overproduction persists, and even while there is any real danger of another outbreak of overproduction, there can be no real safety for distributors in any free market, and oil men in London feel strongly that, whatever benefit market organisation may have gained from the co-operation among independents in the Independent Petroleum Federation, conditions in the British market have only to remain definitely profitable for distributors for a short period, and new competitors will arise, anxious to participate in the business, and ready to cut prices to obtain their share.

Crude quotations remain the ultimate basis of the price structure in Britain, as in all other markets which remain free from direct official control and regulation, and experience has shown that the maintenance of crude quotations is out of the question while serious overproduction persists. Roumania has recently succeeded in disposing of its products without competing in Britain on the former scale, and the United States has thus become even more than before the predominant factor in determining petroleum prices. The Stock Exchange, therefore, has sound reasons for basing its recent optimism on evidence of better conditions on the other side of the Atlantic, as well as on the strengthening of the British market for oil products.

ALEC H. DAY

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Bahrein Refinery

IT HAS been officially announced in London that the Bahrein Petroleum Company will start in December construction of a 10,000 bbl. per day refinery on Bahrein Island so constructed as to permit its daily capacity to be doubled with a minimum amount of change.

One of the newer service stations in a large American City.

Handling A $1,531,724,000 Business

Trend Toward Wider Distribution and Lower Volume per Unit in Service Stations Noted in Census Survey of Retail Outlets. Filling Stations Among Most Stable Enterprises.

A SHARP swing upward in the total of filling station outlets between 1929 and 1933, but a deep dip in revenues during the same period, is shown in a compilation of exhaustive data on retail distribution recently completed by the United States Department of Commerce, Bureau of the Census.

The study, covering retail and wholesale distribution of virtually all commodities, is contained in some 17 volumes, with the data gathered by Civil Works Administration workers as part of the made work program of the Roosevelt Administration. It shows these following salient points in petroleum marketing at retail:

1. That stations doing from $10,000 to $20,000 a year account for the largest single portion of the volume of filling station business.

2. That filling stations account for 6.1 percent of the 1,526,119 total retail trade outlets in the nation, doing about one twenty-second of the $25,037,-225,000 total volume of business in 1933, as compared with 3.6 (1,543,158) and approximately one-thirtieth of the 1929 volume of $49,114,653,000.

3. That operating expenses per $100 of sales were considerably higher in 1933 than in 1929.

4. That more persons were employed in 1933 than in 1929 but payrolls were smaller, along with per capita earnings.

5. That less credit was being extended to the consumer than in 1929.

6. That the value of stocks on hand at the end of the year was smaller as a whole.

7. That there had been a slight but distinctly perceptible increase by chain stations in volume of business.

8. That the largest single proportion of filling stations was in towns of 2,500 and less.

9. That fewer than 7 percent of the country's filling stations disappeared in a year, while ownership of 9.1 percent turned over yearly.

Similar general trends were noted throughout the various geographical regions of the United States in the retail distribution of petroleum products, while developments in the wholesaling end fell within the same general lines.

Summary of Retail Distribution of Oil Products

	1933	1929
Number of Stations	170,404	121,513
Volume of business	$1,531,724,000	$1,787,423,000
Full-time employees	143,391	126,721
Total payroll, including part-time employees	$151,938,000	$159,212,000
Average annual earnings for full-time employees	$990	$1,208
Stocks at end of year	$65,016,000	$83,655,000
Operating expense per $100 of sales	$32.45	$23.81

Independent and chain store operations were set forth in a separate volume of the study, which found that in almost all other retail divisions, as well as filling stations, the chain store type of operation was slicing into the independent. The only types in which no change or a decline in chain operations were found were: family clothing stores, furniture stores, radio stores, grocery stores that did not handle meats, and jewelry stores.

An increase in chain operations was noted for department stores, shoe stores, combination grocery and butcher shops, cigar stores, drug stores, variety stores, men's stores, women's apparel stores, and restaurants. In the petroleum industry, the general trend was presented as:

Independents, who had 66 percent of the business in 1929, only had 64.3 in 1933, the dollar value in the latter year being $984,867,000 in net sales, as compared with $543,682,000 by the chains, with the independents operating 134,239 outlets as compared with 36,026. Total reported expenses of the chain operators, however, were larger than for the independents, the respective amounts being $175,906,000 and $165,666,000, showing a much lower cost of operation per unit by the independents.

Payrolls of the chain stations were higher than for the independents, the averages being $1,130 and $838 a year, with the totals: chain, full-time employees, 74,226, receiving $86,382,000, as compared with independents' employees totalling 68,868, paid $65,202,000. Part-time employees: chain, $2,513,000; independent, $7,508,000. To offset the employee factor, however, the independents recorded 155,734 proprietors, as contrasted to 647 for the chains.

A growing trend toward decentralization of distribution outlets and toward smaller-cost stations was indicated in the report, which pointed out that:

Of the 170,404 filling stations in 1933, 53 percent were in places of less than 2,500 population, doing 31 percent of the total sales volume, as compared with only 17 percent of the stations being in cities of 100,000 or more population, and accounting for 30 percent of the volume.

The division of stores and sales classified according to the basic population groups, follows:

Filling Stations and Sales Classified by Population

Size of Cities	Percent of stores	Percent of sales
500,000 or more	7	13
250,000 to 500,000	5	9
100,000 to 250,000	5	8
75,000 to 100,000	2	3
50,000 to 75,000	3	5
30,000 to 50,000	4	5
20,000 to 30,000	3	4
10,000 to 20,000	6	8
5,000 to 10,000	6	7
2,500 to 5,000	6	7
Less than 2,500	53	31

Corresponding with these data, the report sets forth that whereas filling stations in the larger cities constitute only four percent of the total retail outlets for all goods, and do about five percent of the total business, they account for 18 percent of all retail places in towns of less than 2,500 and in them do 11 percent of the entire retail sales.

Total Number of Stations and Sales in 1933, by Population

Size of Cities	Stations	Sales
500,000 or more	12,129	$198,624,000
250,000 to 500,000	8,648	$134,670,000
100,000 to 250,000	9,287	$122,523,000
75,000 to 100,000	2,616	$39,152,000
50,000 to 75,000	4,852	$71,260,000
30,000 to 50,000	5,950	$82,282,000
20,000 to 30,000	5,122	$64,818,000
10,000 to 20,000	10,106	$125,293,000
5,000 to 10,000	10,504	$113,106,000
2,500 to 5,000	10,511	$98,834,000
Less than 2,500	90,679	$481,162,000

With this picture of business operations in 1933, one may consider more clearly the Census Bureau's data showing that the trend between 1929 and 1933 was definitely toward wider distribution and smaller volume operations, as set forth in the accompanying Table 4.

Table 4

Volume per unit per year	1933	1929
	Per cent of national volume	
Under $10,000 a year	70.1	54.0
$10,000 to $49,999	28.2	41.5
$50,000 to $99,999	1.2	3.7
$100,000 and over	0.5	0.8

That the $10,000 to $20,000 bracket accounts for the largest single slice of the total volume is shown in Table 5.

Table 5

(1933)

Volume per unit a year	Stations	Total Volume
Less than $10,000	119,701	$440,216,000
$10,000 to $19,999	33,580	$469,905,000
$20,000 to $29,999	9,331	$221,884,000
$30,000 to $49,999	5,166	$188,191,000
$50,000 to $99,999	2,103	$130,212,000
$100,000 up	523	$ 86,316,000

The report shows one $1,000,000 filling station in 1933, but does not identify it beyond noting that one station had a place all alone in a bracket entitled "$1,000,000 or more" with sales of $1,095,000.

In dealing with old and new enterprises in 1933 as compared with 1929, the report found that filling stations were among the more stable businesses in point of disappearance of outlets, while the companion automotive trade was one of the highest, with the respective figures:

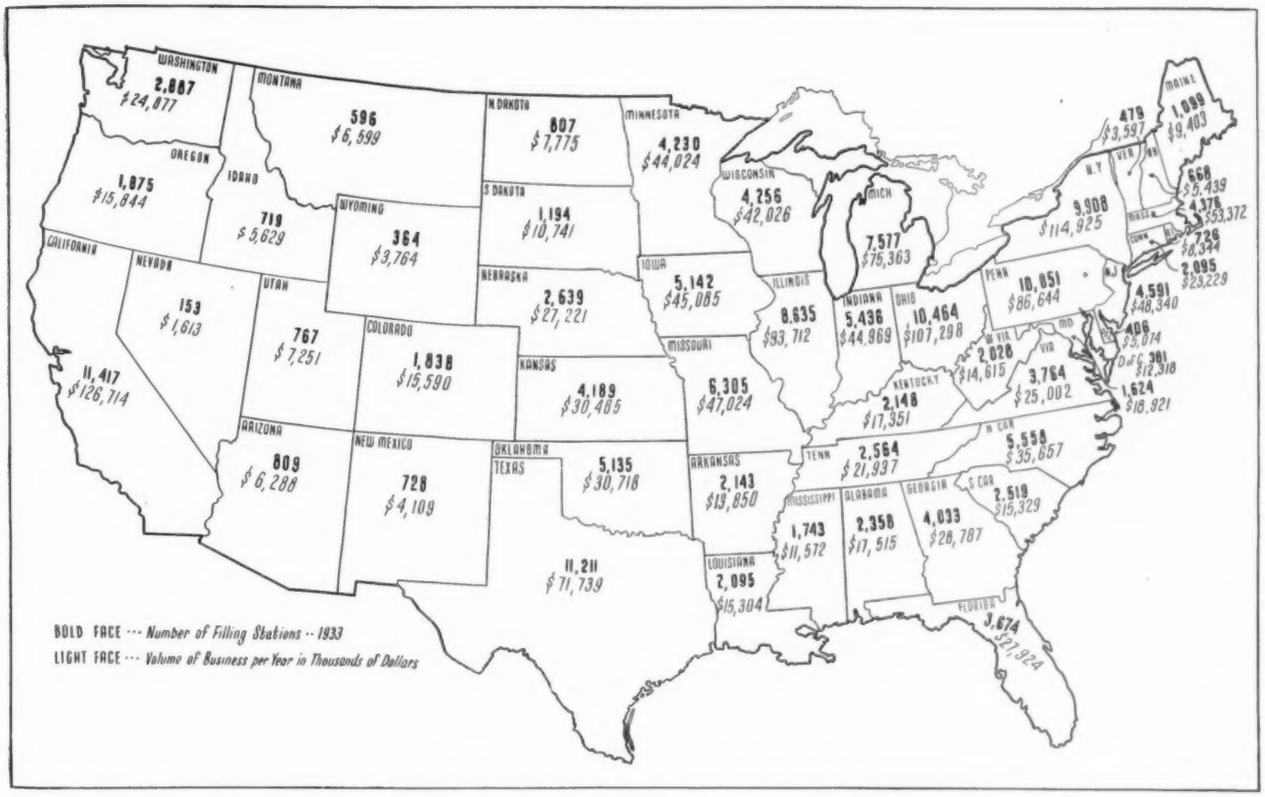
Automotive, more than 23,000 dealers or approximately 50 percent of the total in business in 1929, had disappeared or lost their identity in 1933.

Although 33,470 filling stations disappeared, they constituted only 27.5 percent of those in operation in 1929, a loss ratio of less than seven percent a year, as compared with 12.2 for electric shops, 14.7 for cigar stores, 11 percent for florists, 45.6 for furniture dealers, 11 percent for home ware and appliance stores, and 6.9 for second-hand stores.

Old stations operating in 1929 totalled 88,043 out of the total of 121,513 counted that year, with 82,361 new stations in the period 1930–33. In the period, the 33,470 that disappeared represented six percent of the 1933 total, 27.5 of the 1929 total, and an annual average loss of 6.9 percent. The ratio of turnover in station ownership totalled 36.4 for the 1930–33 period, an average of 9.1 a year.

On the new station side of the ledger, the average for the 1930–33 period was 18,489 a year, with 26,894 opened in 1933, and with the 1933 sales of new 1933 outlets totalling $84,921,000 or about six percent of all sales that year. One interesting point in connection with new station opening in 1933 is that the largest number was opened in the third quarter of the year, attributed in Washington to the advent of the Petroleum Code, promulgated in August of 1933. The new station figures by quarters in 1933: first, 2,681, with sales of $17,585,000; second, 7,195, sales $31,867,000; third, 9,450 with sales $26,355,000; fourth, 7,568 with sales of $9,114,000.

Credit sales to consumers appeared to have fallen off somewhat in 1933 as compared with 1929, on the basis of the Census Bureau's data. However, the figures



Distribution of service stations and volume of business per year in 1933 according to the survey recently completed by the Census Bureau. The report considers as service stations only those retail outlets where the sale of oil and gasoline is the principal business.

for 1929 are not completely segregated as are the 1933 data. As given in the Bureau's report, the figures are as follows: among 104,855 stations reporting in 1933 credit sales amounted to $337,572,000 against 47,483 stations reporting $242,686,000 credit sales in 1929.

State-by-state summaries in the Bureau's report show that the credit business percentage runs higher in the Southern, Southwestern and Pacific Coast states than in the East, Middle West, North Central and New England areas.

Accessories and repairs, along with sales of gasoline and oils, accounted for virtually all the station income in 1933, with the $1,531,724,000 total made up as follows: merchandise, which included accessories, $1,479,005,000; repairs and service, $42,324,000; meals and beverages, $6,008,000; sales to other retailers, $43,887,000; miscellaneous, $4,387,000.

In the wholesale division, bulk stations increased in 1933 over 1929, spreading from 19,611 to 26,176, while sales fell off to $1,884,644,000 as compared with $2,390,000,000 in 1929, figures comparable to the trends in retail stations. Expenses aggregated $372,314,000 or 19.8 of sales.

Wholesalers of petroleum and its products, including jobbers, brokers, etc., totalled 28,421 in 1933, as compared with 23,007 in 1929, while 1933 sales aggregated $2,288,929,000, distinctly down from $3,233,663,000 in 1929, with expenses in 1933 totalling $423,017,000, or 18.5 percent of sales.

New wholesale enterprises from 1929 through 1933 totalled 4,949.

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Lithuania Adopts Enforced Alcohol Admixture

THE LITHUANIAN Government recently passed a law requiring gasoline to be diluted with dehydrated spirit. The Minister of Finance is empowered to prescribe the percentage of alcohol and the strength and grade which is used to dilute the gasoline, and the maximum prices of the solution. This law was published July 6th, last, and will come into effect not before March, 1936. It was designed with a view to aiding the farmers, as about 80 percent of the population gains its living from agriculture. It is planned that 25 percent alcohol shall be mixed, or about 2,000,000 litres. This will require the treatment of about 500,000 cwt. of potatoes, and 13,000 cwt. of grain. It is anticipated that for the most part the new law will be met with favor from the motorists, as agriculture might be called the backbone of the country. Transient motorists may bring in 50 kg. undiluted petrol.

A Practical Petroleum Policy

Dr. Siro Vazquez M., Inspectoria Technica de Hidrocarburos, E. U. de Venezuela, Describes the Advantages of a Liberal Petroleum Policy Both to the Operating Companies and the Nation.

IN THE northern part of South America, tempered by the tropical sun and bathed by the waters of the Caribbean Sea, stands Venezuela, a country richly endowed by nature with all kinds of resources and natural products, showing on its surface every type of topography from the smoldering plains and coasts to the eternally snow covered peaks of the Andes.

The development of these large resources has been impeded and in some instances rendered impossible by the scarcity of its population, which being already small in the times of the Spanish Colony, was further minimized by the long and deadly war of independence and by the tragic period of almost a century of civil wars which followed it.

In spite of this obstacle, during the last thirty years of peace, agricultural, cattle and mining enterprises have flourished with great impetus. It was during this period that the discovery that has revolutionized the Venezuelan economic life was made: Venezuela had oil and plenty of it.

What this discovery and subsequent developments meant to the country is long to detail, but for the moment it suffices to say that Venezuela today has no external or internal debt, there is no income tax and real estate and other taxes are very small.

Venezuela's position as an oil country was and is most enviable. From an economical standpoint it is commercially near to all important consuming centers, its petroleum being cheaply transported to Europe, Eastern North America and Latin-America. Strategically considered, its closeness to the Panama Canal renders it capitally important in case of war, being on the route to the Far East and able rapidly and safely to supply demands on both the Atlantic and Pacific Oceans.

This excellent location, its large and cheap potential production, together with the most favorable petroleum laws have brought the Venezuelan petroleum industry to its desirable position of today.

The first concessions for the exploitation of petroleum given in Venezuela were and are ruled by the Mining Laws of 1910. In 1918 a new law of mines came into effect. In the short period of ten years to 1928, six more laws, specially applicable to petroleum and other mineral fuels, respectively succeeded each other.

The one characteristic of all these laws is a consideration for the interests of the operating enterprises. The main points are to be given in the following paragraphs.

The oil and gas stored in the formations belong to the nation. Concessions and leases for its exploitation are given by the federal government, the said exploitation being of public usefulness (Utilidad Pública) which implies the right of legal expropriation of the necessary surface from its owners by paying them a reasonable indemnization, determined by experts in case of no agreement of the parties.

The taxes and royalties to be paid by the producer are as follows: 1) A small initial exploration tax of approximately one American cent per acre, at the actual rate of exchange. 2) An initial exploitation tax of about 20 cents per acre. 3) A yearly surface tax of about 20 cents per acre during the first three years of the lease, 40 cents per acre during the next 27 years and 50 cents during the rest of the lease. 4) The exploitation tax or royalty, which amounts to 10 percent of the commercial value in the Venezuelan shipping port of the oil exploited, with a minimum of about 50 cents per ton. The government can choose to have its 10 percent royalty in oil rather than money.

For concessions covered with the water, the sea, lakes or large rivers, the surface taxes are reduced to one half and the exploitation tax or royalty to three fourths of the mentioned values. When the concessions belong to the national reserves taxes are somewhat larger.

The petroleum law also relieves these enterprises of the import tariffs on the materials necessary to their operations. Incidentally, had the government chosen to collect the import tariff on materials, and not to have an exploitation tax or royalty, the tariff revenue would have been larger than the actual royalty income.

Add to this the immigration facilities and the lack of restrictive legislation on the movement of money out of the country, such as exist in other oil producers, and the reason for the great flow of capital into the country subsequent to the discovery of oil will be seen.

The first companies to be organized for the exploitation of Venezuelan petroleum were European interests. First the Shell group and the British controlled. The first group composed of the Venezuelan Oil Concessions Ltd., the Caribbean Petroleum Co., the Colon Development Co., etc. secured what was thought to be the best of the available concessions. A few years later, in 1918, the first American companies, the Standard group, started securing concessions, being shortly followed by the Gulf (Venezuela Gulf Oil Co.). Many other European and American enterprises got leases in Venezuela, but either released them on royalty to one of the above groups or have not started or completed development of their concessions, their economic importance being therefore small.

From the beginning of its era as an oil producing country, Venezuela attracted the eyes of the world as having great potentialities. It certainly has not defrauded the hopes set on it. Very few countries indeed can show fields as prolific as the Mene Grande field, which started producing in 1914 and twenty years later, after yielding about 150,000,000 bbl. of oil has not a single well on the pump. Or the Lagunillas field, the oil of which because of its exceedingly large and cheap production and its favorable position to the loading and shipping can easily compete with that of nearly any other field in the world.

The present era is certainly very good to the Venezuelan petroleum, but even so the future looks a lot better. Most of the country's territory is of fresh water sedimentary character, therefore favorable to the origination of petroleum, and wherever the formations permit it accumulation has taken place, and deposits so formed are waiting for the discovery well. In the opinion of most of the oil men working in Venezuela, its oil resources have hardly been touched.

Why then is not Venezuela's production

considerably higher than its present rate? The wise policies followed by the oil companies operating in Venezuela give an answer to the question. So little of the Venezuelan oil is in storage that its economic influence is negligible. These companies are producing oil to supply a demand and it is produced as the demands require it. How different had been the story of the oil industry if all the oil producing enterprises had adhered to this sound policy. It is true that in Venezuela this policy has been made easily attainable through the existence of many fields owned by a single company, and the absence of small producers, with their anti-economical procedures in the group-owned fields.

Other advantage of the Venezuelan operator, associated with the absence of the small producer, is the possible control of production so as to keep not only within the limits of the demand as already mentioned, but to obtain the maximum use of natural lifting powers, by producing at a reasonably low gas-oil ratio, which at least down to a certain point (corresponding to the minimum gas-oil ratio) decreases with the production per flowing well. This certainly decreases the lifting cost per barrel of ultimate recovery thus resulting in cheaper production. Increasing demand can be met by drilling new wells rather than producing existing ones beyond their economic limits. Not that Venezuelan fields should be set as universal examples of efficient production; waste of available natural energy is one of the characteristics of the oil industry, and Venezuelan fields are no exception; conditions could have been greatly improved if the problem of increasing efficiency had been attacked at the beginning of the producing life of the fields. The example of Mene Grande will stand as a classic in the history of the oil industry.

It is no wonder then that with so many natural advantages and a measure of government cooperation the country's oil industry has progressed to where it is today: the third place among the oil producing countries in the world, and with an immediate and brilliant future.

What Venezuela has done for its oil industry this has most generously repaid, the oil revenue being second only to the import tariffs income, and therefore of paramount importance on the building of the civilian and economical conditions of the country to their present status.

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Search for Paleozoic Oil in Europe

By W. A. J. M. van Waterschoot van der Gracht

AN INTERESTING development in European exploration is the search for oil and gas in the upper-Carboniferous foreland zone, bordering the front of the Permo-Carboniferous (Variscide) chains in Belgium and in Westphalia. This idea has been stimulated by the similarity of source and reservoir sediments and general geologic and structural conditions with the Appalachian oil and gas belt in Pennsylvania and West-Virginia, which extends along the outer front of the very similar Appalachian Mountains, of about the same age as the old European Mountains south of the coal fields of Westphalia and Belgium. A more or less similar condition repeats itself in Oklahoma and Texas.

Evidently a search of this nature can only be made at a certain distance from the strongly folded and overthrust mountain front, where regional metamorphism has not unfavorably affected eventual oil deposits. In the zone worked by coalfields the sequence is still devoid of oil and is only moderately gas bearing, while most of these gases apparently originate from the coal seams.

Contrary to conditions prevailing in North America, exploration on the European continent is handicapped by the great thickness of Mesozoic, and locally also Tertiary sediments which overlie the Carboniferous, a thickness which soon reaches 4,000 to 5,000 ft., making deep drilling imperative and structural subsurface work difficult. On the other hand certain locally concentrated asphalt deposits and seepages of gas, confirmed by blow-outs of wet gas and even oil showings in several older and not sufficiently deep wells, drilled for coal, are encouraging.

The source beds must be sought in the lower-Carboniferous. They seem at least as promising as those in the Appalachian oilbelt of America, notably in the region where these strata are developed in the so called *culm facies*. The source region can scarcely be reached even by modern drilling for petroleum, which now reaches depths of 12,000 ft., but accumulation is expected in sandstones of the coalmeasures. This seems justified since petroleum gases permeate even the Cretaceous, and in a few localities on the foreland actual oil has been encountered in coalmeasure sandstones.

At present two important test wells are drilling, the one near Ascheberg, south of Munster in Westphalia, on a subsurface anticline, characterized by a concentration of strong showings (even blowouts) of wet petroleum gas, including a 30 years old well which, although in very poor condition, still yields gas at 400 lbs. pressure. The other well is near the village of Moll, in the Belgian Campine. Both test wells are a considerable distance north of the zone worked by coal mines. They are of the most modern type, equipped with machinery which will enable the operators to reach the greatest depths modern technique permits, if such should be required.

Both wells have now reached a depth of around 3,000 ft. The one in Belgium has just reached the Carboniferous, the one in Westphalia is drilling in the basal Cretaceous, a short distance off the Paleozoic. Both wells have already shown very considerable gas; in one of them special precautions had to be taken against a threatened blowout.

Powerful independent capital is back of this research work, which is directed by F. J. G. Vingerhoets and advised by the writer in a consulting capacity. Several other tests are planned on suitable blocks of acreage already assembled. Further geologic details will be given at the International Mining Congress, now assembling in Paris.

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LUBRICATING mineral oils and greases and also refined mineral oils in liquid state, may be imported into Greece from any country, but under the revised system of import quotas introduced by the Greek government such import is restricted to 450,000 kilogrammes.

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OUR FRONT cover picture this month shows a rough stretch of road near the Tonoro River in Venezuela with supplies for a geological party being carried over it by truck.

Doorway of the Royal Dutch offices at The Hague in Holland.

Foreign Oil Legion

Dr. HANS TROPSCH, associate director of research, Universal Oil Products, died October 8, 1935.

Dr. Hans Tropsch.

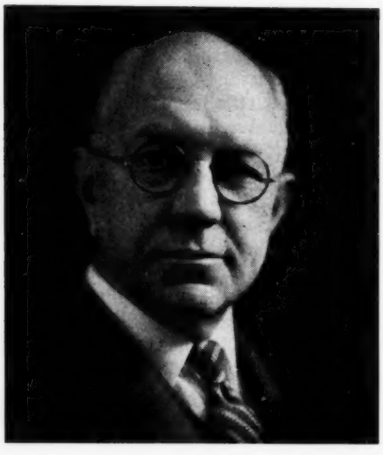
After twenty years of service with Shell Oil Company of California during which he attained the position of general manager in charge of marketing, L. T. Kittinger has been transferred to handle corresponding activities for Shell Eastern Petroleum Products Company, a subsidiary of the Shell Union Oil Corporation. No successor for the position vacated in San Francisco has been named to date.

An INVITATION was received by the Institution of Petroleum Technologists from the Association Française des Techniciens du Petrole, of which society Col. Louis Pineau is Honorary President and M. Charles Bihoreau is President, to hold the World Petroleum Congress, 2nd Session, in Paris, in June or July 1937. This date coincides with the Exposition Internationale which is being organized in France.

The Council of the Institution of Petroleum Technologists was pleased to accept this invitation. The task of organizing the second World Petroleum Congress will devolve on the French Association, but the Council of the Institution of Petroleum Technologists will remain in close touch with arrangements.

Guy STEVENS, New York, plans to leave for England and the Continent in the near future.

Guy Stevens.



John CATANARI has opened up a Technical and Commercial Commission in London on behalf of Yacimientos Petroliferos Fiscales Argentinos (Y. P. F.). He will be in charge of the study and purchase of the necessary material for the operating of the government company's oilfields, pipelines, storages, refineries, tanker fleets, etc., and for the transport and marketing of the products manufactured. The offices are at Bush House, Strand, London, W. C. 2.

William L. GOMORY, Chemical Engineer and Petroleum Technologist, Technical and Patent Counsel for the Process Management Company is in charge of European patent matters with headquarters in Paris, France. He is well known in the technical and legal circles of the refining industry, both in the United States and abroad.

After 20 years of activity in designing, constructing and managing oil refineries at home and abroad, he was appointed, in 1926, by the Standard Oil Development Company as Technical and Patent Advisor, in charge of European patent matters.

W. L. Gomory.

United States

	Daily Crude Oil Production bbl.	Daily Runs to Stills bbl.	Total Motor Fuel Stocks bbl.	Imports for week bbl.	California Shipments East for week bbl.
Week ending Oct. 12..	2,828,500 474,000[1]	2,735,000	52,628,000	751,000[2]	117,000
Week ending Oct. 19..	2,825,000 471,500[1]	2,725,000	52,162,000	1,235,000[2]	78,000
Week ending Oct. 26..	2,825,500 458,500	2,750,000	51,554,000	718,000[2]	74,000
Week ending Nov. 2...	2,828,500 459,500[1]	2,725,000	51,571,000		

Underlined figures indicate improvement in statistical position—decrease in production, runs to stills, gasoline stocks and imports.

[1] Estimated total production of the East Texas field, official and unreported.

[2] Import figures include all oil imported, for domestic use and in bond for re-export, it being impossible to make the separation in weekly statistics.

U. S. Imports and Exports of Petroleum and Products
(U. S. Barrels; 000 omitted)

	Imports*		Exports	
	Crude	Products	Crude	Products
January	2,011	2,073	2,369	6,411
February	1,903	1,786	2,804	3,830
March	2,608	1,807	3,281	6,564
April	2,599	1,851	3,776	4,305
May	3,433	1,641	4,613	5,133
June	2,848	1,988	5,589	7,362
July	2,520	1,704	5,832	7,093
August	3,354	1,458	4,946	6,631
September	2,908	1,839	4,971	7,867

* Includes non-dutiable imports for bunkering and re-export.

Federal and State Developments

THE Guffey Coal Bill became effective on November 1, although the 15 percent tax on the sale price of coal at the mine will not be collectible until January 2. Under the law 90 percent of the tax will be rebated to producers agreeing to obey the code governing the competitive conditions within the industry, including wages and hours of labor. The constitutionality of the Guffey Coal Bill is now before the District of Columbia Supreme Court in a suit brought by the Carter Coal Company asking for a permanent injunction. The importance of the Guffey Coal Bill to the oil industry is due to the fact that if held constitutional, which is unlikely, a similar law could be easily passed affecting the oil industry, thus again placing the industry under "little N. R. A."

Federal District Judge Coleman ruled on November 7 in Baltimore that utilities act was unconstitutional in its entirety on the grounds that Congress had exceeded its lawful powers under the commerce clause of the constitution. Judge Coleman further declared that Congress in this act was violating the "due process" clause of the constitution.

Definite improvement took place in the East Texas field during the past month, with hot oil production declining to around 30,000 bbl. per day, as compared with 50,000 bbl. per day about one month ago. Since in hot oil production is included oil supplied from earthen storage pits, actual production of hot oil from wells probably does not exceed 15,000 bbl. per day, a remarkably low volume considering that there are in the field at this time over 19,000 oil wells and some 1,200 operators. Reduction in shipments of products derived from hot oil was achieved by stricter requirements of Federal and State Tender Boards and by curtailment of tank car and tank truck shipments, with tank truck traffic declining some 50 percent in the last two months. The earthen pit problem is being solved by their destruction in a campaign launched by State Attorney General McCraw.

Though the price situation in California was improved by the increased posted prices by the Standard Oil Company of California, which advanced crude oil prices on November 1 by 8 to 35 cents per barrel and increased retail gasoline prices in Southern California by 3½ cents a gallon, the crude oil production soared to a record volume of 664,000 bbl. per day in the week ending November 2. The advance of crude oil prices, which was initiated in California by the Union Oil Company, was due to the loss of connections by the major purchasers, to the smaller companies paying 15- to 25-cent premiums and, as previously indicated in WORLD PETROLEUM, to the lack of discoveries of new crude oil reserves on the Pacific Coast, with indications that California will experience a serious oil shortage within two years. Statistically the situation in California was probably greatly assisted by export shipments.

Prices Firm

DURING the last 30 days crude oil and gasoline prices have continued firm throughout the United States, with local advances in crude oil prices in California and in Pennsylvania. Retail motor fuel prices improved in California and remained strong east of the Rocky Mountains with marketing policies of the larger integrated oil companies becoming more conservative, and due in part to the continuance of purchases of surplus stocks from small independent refiners. A major test of the firmness of currently stabilized motor fuel prices is due during November and December when gasoline consumption will show seasonal decline, though at this writing it appears as if the current momentum may carry higher prices into the 1936 spring season, unless very unfavorable developments occur unexpectedly. The export situation remained good, while President Roosevelt's plans eventually to prevent exports of petroleum products to nations at war may result in increased exports from the United States in 1936 to the countries which may anticipate war and which will accordingly plan to increase their storage during peace. While several important oil field discoveries have been made recently in the United States, all of these are in areas that will be easily controlled, and none, as yet, are of first magnitude.

During the past month refinery gasoline quotations remained firm and unchanged for the fifth month in succession, a most favorable development considering the seasonal slump of demand. Natural gasolines lost about ½ a cent a gallon, influenced by increased production in the Panhandle area due to temporary postponement of the state natural gas conservation laws.

Posted crude oil prices during October and November remained firm and unchanged at $1.00 per barrel for 36 gravity Mid-Continent crude and $1.00 flat per barrel for East Texas crude. In California the Union Oil Company initiated higher prices on October 26, advancing light grades as much as 72 cents per barrel (39 gravity Kettleman Hills crude was advanced from $0.56 to $1.28), or to prices higher than were in effect before August 29 reductions. Standard Oil Company of California posted increased prices effective November 1, scaling down advances as posted by the Union Oil Company, and the new schedule was met by all major purchasers including the Union Oil Company. The new prices increase heavy crudes by 8 to 10 cents per barrel, and lighter grades by 20 to 30 cents per barrel, restoring the premiums paid for lighter grades. Effective October 29, Joseph Seep Purchasing Agency of South Penn Oil Company announced

a 15-cent increase in prices of Pennsylvania crude oil, raising Bradford district oil to $2.15 per barrel and the Pennsylvania grade oil in Eureka Pipe Lines to $1.82.

Tank wagon/service station motor fuel prices per gallon, regular grade, including all taxes, in representative districts during the middle of November were: 15.05/19.3 cents in metropolitan New York (13.5/17.0 cents in Newark, N. J.); 13.0/16.5 cents in Boston, Mass.; 12.0/13.5 cents in Providence, R. I.; 14.0/16.0 cents in Chicago; 17.0/19.0 cents in Ohio; 14.0/16.0 and 14.0/16.0 (up 3½) cents in San Francisco and Los Angeles respectively, while independents were gradually meeting higher quotations posted by the major oil marketers; 16.0/18.0 cents in Oklahoma; 15.0/17.0 cents in Dallas and Fort Worth and 16.0/18.0 cents in Houston, Texas, with third grade gasoline in the East Texas area selling at from 10 to 12 cents per gallon at independent stations; 15.2/17.2 cents in St. Louis; 20.5/23.0 cents in Montreal, Canada; all with a 2-cent differential for premium grade.

Refinery gasoline quotations in the Mid-Continent area remained firm and unchanged during the last 30 days. Refinery gasoline was quoted on November 10 at 4¾—5 cents per gallon for 58–60 U.S.M. grade 62.9 and below octane rating in Group 3, Oklahoma market; 63.0/70.9 octane rating, U.S.M., regular grade, was quoted at 5⅝–5⅞ cents per gallon; and 71 and above octane rating, U.S.M., premium grade was nominally quoted at 5¾–5⅞ cents per gallon. East Texas markets continued firm with prices on par or ⅛ of a cent per gallon under Group 3 quotations; third grade product, restricted to intrastate markets not having approved federal tenders, was quoted at as low as 2¼ to 3 cents per gallon. On the East Coast at Bayonne, U.S.M., grade 60.0–64.9 octane rating gasoline continued unchanged at 5¾ cents per gallon (3.39 cents gold*). Gulf Coast prices for export advanced ½ a cent per gallon during the past month, reaching 5⅛ cents per gallon (3.02 cents gold*) for grade 58–60 U.S.M. by November 10.

Natural gasolines lost as much as ½ a cent per gallon during the past month, influenced by higher rate of production in the Texas Panhandle and north Texas areas. On November 10 grade 26–70 was quoted at 3¾–4 cents per gallon (2.29 cents gold*) in Oklahoma; at 3½–3¾ cents per gallon (2.14 cents gold*) in North Texas; and at 4⅛ cents per gallon (2.44 cents gold*) in North Louisiana.

Kerosene prices continued unchanged during the past month. On November 10 grade 41–43 w.w. was quoted at 3⅜–3⅝ cents per gallon in Group 3, Oklahoma market; and at 4⅝–4¾ cents per gallon (2.73 cents gold*) on the East Coast at Bayonne. Gulf Coast prices for export also continued firm and unchanged at 3⅞ cents per gallon (2.29 cents gold*) for 41–43 p.w. grade and at 3⅞–4 cents per gallon (2.36 cents gold*) for 41–43 w.w. grade.

Gulf Export Prices for Major Oil Products

	Products	Cents per Gallon			
		Oct. 15	Oct. 22	Oct. 29	Nov. 6
Gasoline:	U. S. Motor	4⅞	5⅛	5¼	5
	64/66-375 E. P.	5⅜	5⅜	5¼	5½
	59 Oct. & below	5¼	5¼	5¼	5¼
	65 Oct. & above	5½	5½	5½	5½
Aviation Gasoline:	73 Oct. & above	9½	9½	9½	9½
Kerosene:	44 w.w.	4¼	4¼	4¼	4¼
	41–43 w.w.	4	4	4	4
	41–43 p.w.	3⅞	3⅞	3⅞	3⅞
Gasoil:	26–30 translusc.	3⅛	3⅛	3⅛	3⅛
	30 plus translusc.	3⅛	3⅛	3⅛	3⅛
Fuel Oil:	Bunker purposes (per bbl.)	$ .80	$ .80	$ .80	$ .80
Grade C:	Cargo lots (per bbl.)	$ .70	$ .70	$ .70	$ .70
	Diesel oil (per bbl.)	$1.50	$1.50	$1.50	$1.50
Lubricating Oil:	Bright Stock No. 8	25½	25½	26	26
(New York Export	Bright Stock No. 6½	25	25	25½	25½
Market)	Warren E.	20	20	20	20
	600 Unfilt.	16½	16½	16½	16½
	650 Unfilt.	18	18	18	18
	600 Flash s.r.	19	19	19	19
	650 Flash s.r.	24	24	24	24
	Neutral 200 No. 3	29	29	29¼	29¼
	Neutral 150 No. 3½	24	24	24½	24½
So. Texas:	Red oil 300 No. 5–6	7¼	7¼	7¼	7¼
	750	9	9	9	9
	1200	9½	9½	9½	9½
	Pale oil 500	7⅞	7⅞	7⅞	7⅞
	750	9	9	9	9
	1200	9½	9½	9½	9½
Crude Oil:	East Texas crude delivered at Gulf port for Export	$1.17	$1.19	$1.20	$1.21
	Venezuela crude	.83	.83	.83	.83
	Trinidad crude	.85	.85	.85	.85
	Panuco crude	.87	.90	.90	.90

Freight Rates

	Oct. 15		Oct. 22		Oct. 29		Nov. 6	
	Dirty	Clean	Dirty	Clean	Dirty	Clean	Dirty	Clean
(Shillings per ton)								
Calif.—U. K. or Continent	14/–	15/–	14/–	15/–	14/–	15/–	15/–	18/–
Gulf—U. K. or Continent	11/–	13/6	12/9	14/6	13/–	15/–	13/–	17/–
(Cents per barrel)								
Calif.—North Atlantic	46	42	46	42	48	45	55	55
Gulf—North Atlantic	15	18	18	20	22	23	25	28

Record Crude Production Continues

CRUDE oil and natural gasoline production during October of 1935 again established an all-time record by reaching over 2,925,000 bbl. per day, about 21,000 bbl. per day above the crude oil and natural gasoline production during the preceding month when 2,904,000 bbl. were produced daily, the former record figure; this production being 340,000 bbl. per day above crude oil and natural gasoline production in October of 1934, an increase of 13.15 percent. The October, 1935, average daily crude oil production exceeded the recommendations of the United States Bureau of Mines by about 281,000 bbl., the largest share of this overproduction again coming from California, which exceeded its quota by 4,680,000 bbl., or by 30.35 percent; while Texas overproduced 2,125,000 bbl. Small overproduction was recorded in Oklahoma which exceeded its quota by some 200,000 bbl. and in Kansas which overproduced 68,000 bbl. during October. The crude oil situation in the area east of Rocky Mountains appears to be under satisfactory control at this time, but in California overproduction may be anticipated to continue until natural declines set in in the Los Angeles Basin fields. While the Bureau of Mines recommended volume of production is estimated on conservative national basis, current recommendations apparently have not taken into full consideration the high rate of exports, which by exceeding 400,000 bbl. per day, have recently seriously affected the normal trade channels.

Crude oil runs to stills during October, 1935, averaged about 2,730,000 bbl. per day, or some 48,000 bbl. per day under the runs to stills during the preceding months, when 2,778,000 bbl. were refined. Total stocks of all petroleum products declined during September, 1935, by 4,466,000 bbl. to a total of 553,587,000 bbl., indicating daily gross withdrawals of 148,900 bbl.

*U. S. Dollar at 41 percent discount.

Effect of Federal Proration Recommendations in Principal Oil Producing States

	Sept. 1933 to Oct. 1935 Cumulative Overproduction		Oct. 1935 Over-production	November 1935 U. S. Bureau of Mines Recommended Quota	Daily Average Production for week ending	
	bbl.	% of total	bbl.	bbl.	Nov. 2 bbl.	Nov. 9 bbl.
Texas	41,895,000	46.8	2,125,000	1,027,000	1,054,000	
Oklahoma	9,050,000	10.0	200,000	492,000	492,500	
California	22,193,000	24.8	4,680,000	505,000	664,000	
Kansas	1,868,000	2.1	68,000	143,300	150,000	
United States	89,112,000	100.0	8,370,000	2,563,700	2,798,500	

Exports Continue High

DURING September of 1935, total gross imports of all petroleum products into the United States amounted to 4,747,000 bbl. (158,000 bbl. per day) as compared with 4,812,000 bbl. (151,500 bbl. per day) imported during the preceding month; out of this total, during September, 1935, 2,826,000 bbl. (94,100 bbl. per day) were imported for domestic use and 1,921,000 bbl. (64,000 bbl. per day) were imported in transit either for refining and re-export or for use in vessels in foreign trade. During August of 1935, 3,054,000 bbl. (98,400 bbl. per day) were imported for domestic use and 1,758,000 bbl. (56,600 bbl. per day) were imported in bond as indicated above. The crude oil imported for refining and re-export amounted in September, 1935, to 886,000 bbl. During September, 1935, the net imports of 94,000 bbl. per day for domestic use were thus well within the former federal recommendation of 108,400 bbl. per day, which was in force under N. R. A.

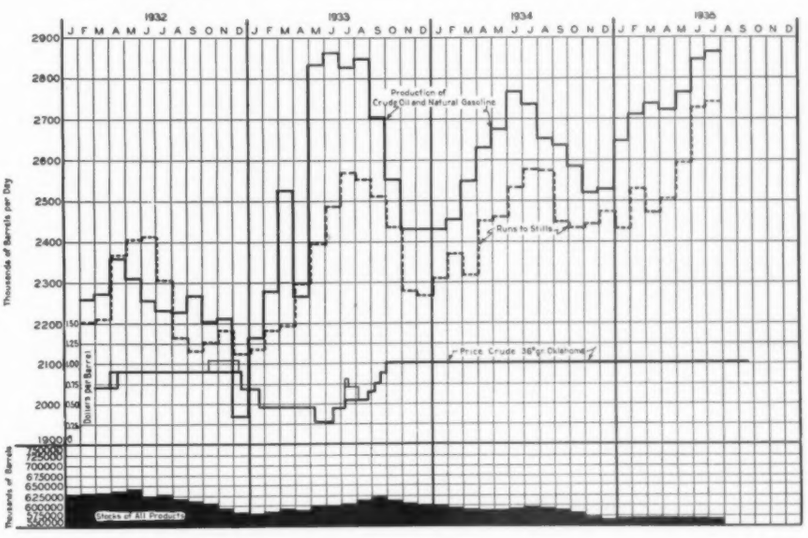
Exports of all petroleum products during September, 1935, increased 14.61 percent above the daily rate of the preceding month, reaching 12,838,000 bbl. (427,500 bbl. per day) as compared with 11,577,000 bbl. (373,000 bbl. per day) shipped during August, 1935. The September, 1935, total exports were 28.47 percent in excess of the shipments in September, 1934, when 9,997,000 bbl. (332,700 bbl. per day) were exported. Therefore, the exports in the June to September period of the current year were at the highest level since 1930. For the first nine months of 1935, the total exports of 93,377,000 bbl. exceeded by 8.75 percent the exports during the same period of 1934, when 85,872,000 bbl. were shipped. Exports of crude oil from the United States during September, 1935, continued in a large volume, reaching 4,971,000 bbl. (165,700 bbl. per day) as compared with 4,946,000 bbl. (159,500 bbl. per day) shipped in the preceding month and as compared with 4,068,000 bbl. (135,500 bbl. per day) exported in September of 1934. Therefore, in September of 1935, crude oil exports constituted 38.7 percent of the total exports of all petroleum products. During the first nine months of 1935, crude oil exports reached 38,181,000 bbl. (139,500 bbl. per day) as compared with 30,733,000 bbl. (112,600 bbl. per day) shipped during the same period of 1934, an increase of 23.9 percent.

During the first eight months of 1935, the gross value of exports of petroleum products reached $157,868,844, as compared with the gross value of all petroleum imports of $24,-864,454, leaving, therefore, a large favorable balance of $133,004,390. Gasoline led in the value of exports during that period, being valued at $40,440,559; followed by crude oil valued at $40,386,684; lubricating oils valued at $40,378,939; fuel or bunker oil for vessels in foreign trade valued at $20,645,716; gas and fuel oil valued at $10,275,598; kerosene valued at $10,232,425; and residual fuel oil valued at $5,636,204. The above import figures, however, include imports in bond and if such imports, valued at $7,955,895 are excluded, then the net favorable balance of the United States is $149,912,949.

Motor Fuel Consumption

INDICATED domestic demand for motor fuel during September, 1935, averaged 1,262,-000 bbl. per day, a seasonal decrease of 8.66 percent below the daily average during the preceding month, when 1,382,000 bbl. were consumed per day; the domestic demand during September, 1935, was 90,000 bbl. per day above the domestic motor fuel consumption in September, 1934, an increase of 7.67 percent; 98,000 bbl. per day above the domestic motor fuel consumption in September, 1933, an increase of 8.41 percent; and 59,000 bbl. per day above the domestic motor fuel consumption in September, 1931, the peak year before 1934, an increase of 4.90 percent. Therefore, during September, 1935, the domestic motor fuel consumption continued at a higher level for that month than in any preceding year.

U. S. production, runs to stills and price of crude oil in relation to stocks of all petroleum products.

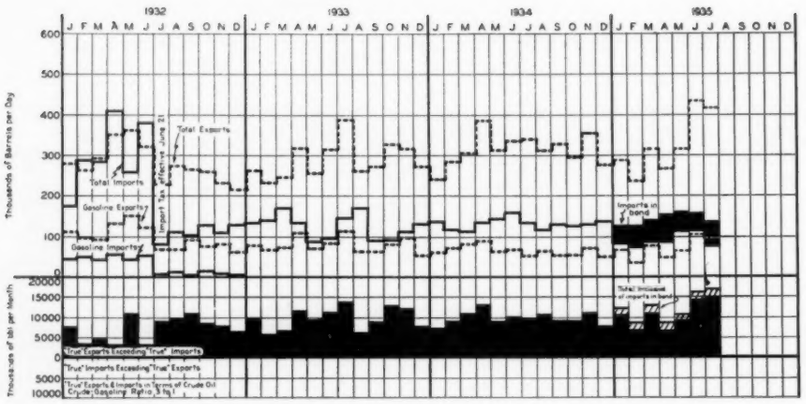


The daily rate of exports of motor fuel continued at a high level, reaching 100,000 bbl. per day in September, 1935, 9.88 percent above the preceding month; 59.6 percent above motor fuel exports in September of 1934; 59.6 percent above motor fuel exports in September of 1933; but 10.6 percent below the motor fuel exports in September of 1931.

On October 1, 1935, motor fuel stocks at refineries, plants, terminals and in transit, inclusive of natural gasoline, amounted to 50,-757,000 bbl., a decline of 753,000 bbl., as compared with stocks on hand on September 1, 1935, indicating that during September motor fuel demand exceeded supply by a small margin of 25,100 bbl. per day. Motor fuel stocks, as of October 1, 1935, were 1,968,000 bbl. below stocks on hand October 1, 1934, when they totaled 52,725,000 bbl.

Oil Field Developments

SOUTHERN OKLAHOMA witnessed last month the most important discovery of the year when Carter Oil Company (S.O.N.J.) and others No. 1 Ruth Williams in section 27, T2S, R3W, in the old Fox pool, was brought in for a large producer estimated up to 10,000 bbl. per day from a total depth of 8,088 ft.; the deepest commercial producer and gusher in Oklahoma. Production is thought to be coming from the Simpson limestone of Ordovician age, though it may also be derived from either Hunton limestone or Viola limestone at 5,100 ft. and 6,500 ft. respectively. The difficulty of determination is due to the fact that 9-inch casing is set 4,909 ft., leaving 3,179 ft. of open hole, and when the drill pipe became stuck 2,000 gallons of acid were injected to loosen the pipe. The well responded with an oil flow and since the operators were not prepared for a producer, the discovery flowed wild for about one week. The crude oil measures about 36 A.P.I. gravity, somewhat too heavy for Ordovician oil, but Hunton and/or Viola limestone oils might be produced together with the Simpson. The Fox pool was discovered by the Gypsy Oil Company in 1915 when its No. 1 Johnson in


1932
1933
1934
1935
J F M A M J J A S O N D
Thousands of Barrels per Day
Total Imports
Total Exports
Import Tax Effective June 21
Gasoline Exports
Gasoline Imports
Imports in bond
Total Increase of Imports in bond
Thousands of bbl. per Month
True Exports Exceeding True Imports
True Imports Exceeding True Exports
True Exports & Imports in Terms of Crude Oil
Crude-Gasoline Ratio, 3 to 1

Total U. S. imports and exports and gasoline exports, indicating imports in bond; and showing evaluation of true exports exceeding true imports.

section 28, T2S, R3W was completed for 22,000,000 cu. ft. of gas per day from 2.018 ft., and subsequently in 1917 the same company brought in an oil well in section 29, No. 1 M. Morris from 2,033 ft. and good for 604 bbl. during the first 24 hours. Eight sands were productive in the Fox pool prior to the recent discovery, the deepest encountered at about 3,300 ft. The new well adds three more potential oil producing horizons, of which at least one is apparently of major importance. The great importance of the No. 1 Ruth Williams is due to the fact that the Fox pool is in the center of several large and small oil fields which were never adequately tested in the deeper formations, and hence the recent discovery will cause eventual re-drilling of the whole south-central Oklahoma extending from the Texas state line to Chickasha gas field. In the few fields where Ordovician formations are truncated, exploration of flanks will be undoubtedly undertaken to uncover conditions similar to those existing in the Oklahoma City field. The new deep discovery, while producing from the well known Simpson series which account for production in Seminole, Oklahoma City and other major fields, and which outcrops on the surface in the Arbuckle Mountains but 10 miles due northeast from the Fox field, uncovered an entirely unfamiliar sequence of beds in the Simpson section and above it, and consequently there is no basis upon which it would be possible to judge either the extent or the performance of this new discovery. Gypsy Oil Company (Gulf), Carter Oil Company, Wirt Franklin Petroleum Corporation and Magnolia Petroleum Company (Socony-Vacuum) are the principal lease holders near the discovery, while Phillips Petroleum Company owns some promising acreage west of the new producer. The following old oil fields are all located within 15 miles from the Fox pool: Velma, Milroy, Sholom Alechem, Tatums, Graham, Wheeler, Healdton and Hewitt. Because of the considerable depth to the Ordovician formations, hard drilling and locally very sharp dips, the exploration of south-central Oklahoma will proceed in an orderly manner and the area does not represent a threat to the crude oil price structure, but rather assures Oklahoma of continued production at current levels after Oklahoma City and Fitts pool decline.

The Fitts pool in Pontotoc County continued to increase its potential production, now reaching 600,000 bbl. per day from over 200 oil wells, with about 35 active operations. The Fitts pool is still undefined on its eastern margins. The allowable production from the Fitts pool has been increased to 32,500 bbl. per day during November.

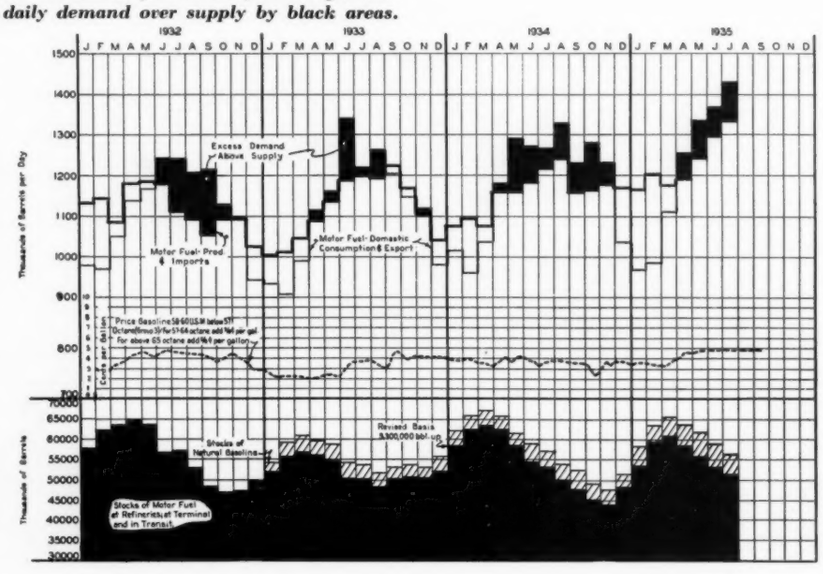
The two key wildcats in Fitts general area were delayed by fishing jobs and at this time Carter Oil Company's and others No. 1 Thompson in section 34, T2N, R9E is resuming drilling operation with a total depth of 6,009 ft.; No. 1 Thompson is correlating structurally very well and is given more than an even chance to become an important pool opener, provided reservoir beds are encountered in the Simpson section. In the same area Continental Oil Company's No. 1 McCarthy in section 12, T1N, R7E encountered sand at 4,621 ft. in the Simpson series and is estimated at 2,000 bbl. per day thus opening a second pool in the general Fitts area. On the outcome of these wells depends the extent of future wildcatting in southeastern Oklahoma.

In New Mexico the Monument field was extended 1½ miles due southeast by the Jeffers-Continental Oil Company No. 1 Britt in section 7, T2OS, R37E which tested 500 bbl. per day through drill stem with a total depth of 3,882 ft. The Monument field now extends five miles due north south and two miles due east west, and embraces currently 12 sections, or 7,680 acres. The Monument field is as yet undefined in any direction and may prove to be the largest pool in New Mexico. At this writing there are 14 producing wells in the field and about 10 active operations.

In Texas, across the border from New Mexico, in Gaines County Walsh and Adams No. 1 Averitt in section 228, G.W.T. RR. Survey, on a very pronounced seismograph prospect of the Amerada Petroleum Corporation encountered 2,000,000 to 3,000,000 cu. ft. of gas at around 2,800 ft. This wildcat, situated about 30 miles due east from Hobbs field, has been correlating very well structurally and is considered an almost certain oil producer. Amerada Petroleum Corporation, Magnolia Petroleum Company and the Atlantic Oil Company are the principal lease owners on this structure, known as Seminole, which resembles and may approximate the Hobbs field in both area and productivity.

BASIL B. ZAVOICO

U. S. production and imports, consumption and exports and price of motor fuel in relation to motor fuel stocks; showing excess daily demand over supply by black areas.


1932
1933
1934
1935
J F M A M J J A S O N D
Thousands of Barrels per Day
Excess Demand or Above Supply
Motor Fuel-Prod & Imports
Motor Fuel-Domestic Consumption & Export
Price Gasoline 58-60 U.S.M. below 51 Octane from 51 to 57-58 octane add ¼¢ per gal. for above 65 octane add ½¢ per gallon
Cents per Gal.
Thousands of Barrels
Revised Basis 3,300,000 bbl. up
Stocks of Natural Gasoline
Stocks of Motor Fuel at Refineries, at Terminal and in Transit

World Oil Production—Official Figures for 1934 and 1935 Revised

All figures furnished direct to WORLD PETROLEUM by Governments, except where otherwise specified

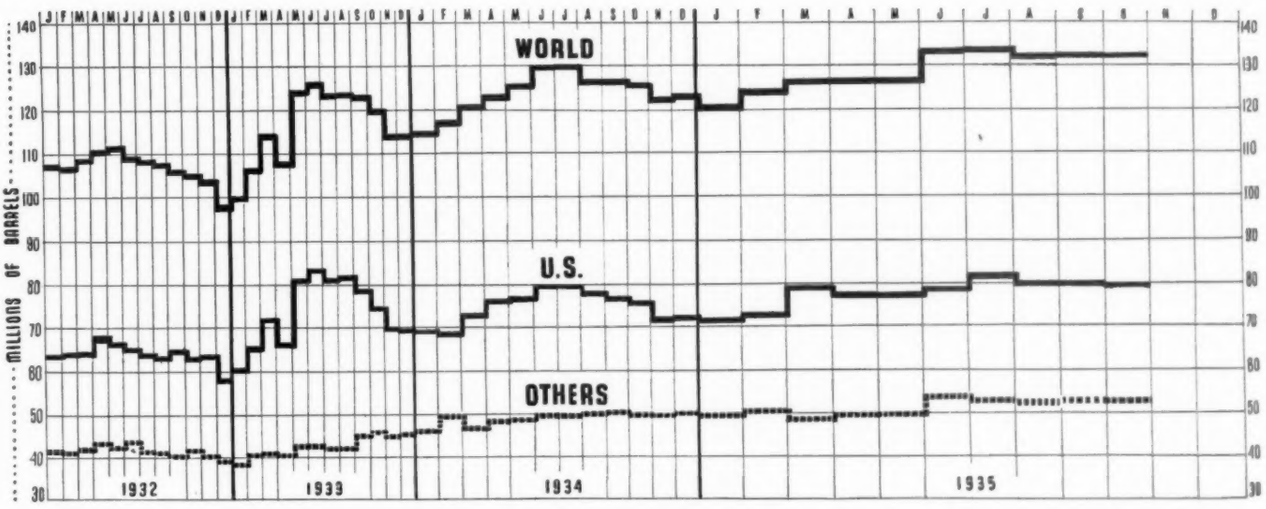
(Figures in U. S. Barrels—Conversion ratio 7 bbl.=1 ton)

Country	November 1934	December 1934	January 1935	February 1935	March 1935	April 1935	May 1935	June 1935	July 1935	August 1935	September 1935	Provisional Figures October 1935
United States	72,463,000	74,772,000	78,715,000	72,763,000	81,488,000	78,427,000	82,454,000	82,338,000	85,485,000	84,816,000	84,109,000	82,435,045
Russia	14,388,500	14,638,400	13,358,000	12,704,300	14,139,300	14,058,200	15,248,800	14,232,400	14,050,000	14,230,000	14,318,000	15,160,000
Venezuela	12,274,794	12,420,296	12,818,414	11,287,605	11,703,825	11,869,900	12,175,022	13,075,118	13,429,885	12,628,067[1]	13,151,362	13,681,619
Iraq[5]	11,618,510	12,006,127	425,000	1,631,000	2,258,123	556,500[1]	1,085,000[1]	4,200,000[1]	1,739,348[1]	1,739,255[1]	1,683,240[1]	1,739,348
Roumania	5,324,000	5,522,000	5,355,000	4,860,000	5,256,000	5,008,000	5,035,000	4,842,000	5,075,000	5,030,000	4,932,000	5,164,259
Iran[2]	3,725,178	4,049,556	4,410,714	4,109,665	4,879,000	4,088,000	3,927,000	4,200,000	4,249,000	4,634,000	4,270,000	4,402,155
Mexico	3,332,926	3,425,314	2,894,167	2,661,632	3,519,148	3,120,035	3,529,659	3,453,871	3,573,632	3,570,908	3,445,725	3,380,333
Netherland India	3,553,067	3,742,810	3,618,272	3,244,717	3,539,564	3,438,848	3,517,360	3,463,061	3,531,857	3,699,430	3,661,259	3,578,795
Colombia[4]	1,633,654	1,554,172	1,653,647	1,141,696	1,466,821	1,377,299	1,486,896	1,518,460	1,639,054	1,567,307	1,555,676	1,522,379
Argentina	1,283,811	1,173,998	1,114,235	1,107,420	1,260,468	1,514,968	1,203,017	1,161,638	1,198,550	1,198,537	1,206,690	1,252,617
Peru[4]	1,340,115	1,420,247	1,418,320	1,269,077	1,395,532	1,329,215	1,451,436	1,414,588	1,448,225	1,442,565	1,448,133	1,432,696
Trinidad	907,655	930,877	915,220	843,619	919,848	899,946	953,108	972,904	988,341	1,003,382	992,445	1,015,492
British India	763,091	746,410	781,170	708,159	773,572	756,461	794,968	768,692	700,000[1]	700,000[1]	711,360[1]	760,182
Poland	308,000	308,000	307,000[1]	297,000[1]	309,000[1]	330,000[1]	340,000[1]	314,490[1]	324,973[1]	274,040[1]	308,220[1]	318,494
Brunei	227,815	258,909	269,794	241,927	264,390	267,603	277,550	269,290	283,430	281,400	256,480	233,310
Sarawak	152,600	158,200	183,300	136,500	152,250	151,067	155,400	150,850	151,830	154,000	145,600	148,400
Japan	119,970	131,059	171,441	151,797	164,174	167,728	154,150	144,160[1]	146,863	152,290	144,312	145,119
Egypt	116,326	115,731	112,147	100,086	104,419	94,955	100,555	99,260	103,488	104,937	100,954	103,341
Ecuador	133,490	140,000	147,315	139,555	151,366	145,212	147,245	137,806	144,812	135,549	138,986	147,449
Canada	113,228	117,113	124,654	111,545	120,537	108,506	122,636[1]	120,102	118,812	117,652	123,919	120,528
Germany[1]	219,485	228,767	287,518	223,153	277,942	240,464	285,747	257,369	276,990	241,801	229,712	266,662
France	46,000[1]	46,000[1]	43,078	34,510	44,191	46,284	46,991	46,000[1]	45,276	46,312	43,530[1]	44,981
Others[1]	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000
Total	134,120,215	137,981,986	129,198,406	119,842,963	134,262,470	128,071,191	134,566,540	137,255,059	137,779,866	137,842,432	137,051,603	137,128,204

[1] Estimate. [2] Anglo-Persian Oil Co. figures revised; fuel oil returned to the ground has been deducted. [3] Thuringia estimated 7,000 bbl.; official figure for Prussia. Russian Sakhalin included with Russia. Japanese Sakhalin included with Japan. [4] International Petroleum Company's figures. [5] Iraq production estimated for 1934 on basis of total year's production represented by oil shipments through Tripoli and Haifa starting January 1935 plus oil necessary to fill line initially. [6] International Petroleum Company and Lobitos Oilfields Ltd. figures.

Official Crude Oil Production for 1932 to 1935

Country	Total 1935 to October 31	Daily Average 1935 to October 31	Total 1934	Daily Average 1934	Total 1933	Daily Average 1933	Total 1932	Daily Average 1932
United States	813,030,045	2,674,441	909,107,000	2,490,704	898,874,000	2,462,670	785,159,000	2,145,243
Russia	141,499,000	465,457	168,648,700	462,051	149,901,900	407,950	149,719,000	409,070
Venezuela	125,820,817	413,884	142,072,329	389,239	120,882,802	331,186	119,596,512	326,766
Iraq	17,056,814	56,108	71,921,468	6,607	1,200,000	3,288	1,200,000	3,300
Roumania	50,557,259	166,307	62,006,000	169,879	50,971,200	139,647	50,491,205	137,954
Iran	43,169,534	142,005	52,663,782	144,284	49,581,280	135,840	45,122,455	123,285
Mexico	33,149,110	109,043	38,167,022	104,567	33,904,882	92,890	32,802,285	89,624
Netherland India	35,293,163	116,096	42,289,408	115,861	38,512,663	105,516	39,584,027	108,153
Colombia	14,929,235	49,109	17,340,724	47,509	13,157,127	36,047	16,384,956	44,768
Argentina	12,218,140	40,191	14,045,652	39,015	13,759,565	38,232	13,166,900	35,975
Peru	14,049,737	46,216	15,936,937	43,663	13,923,281—	38,146	9,899,266	26,026
Trinidad	9,504,305	31,264	10,894,363	29,847	9,560,039	26,192	10,023,780	27,387
British India	7,454,564	24,522	8,997,399	24,650	8,721,655+	23,893	8,600,312	23,500
Poland	3,123,217	10,274	3,697,617	10,150	3,858,085—	10,570	3,905,230	10,670
Brunei	2,645,174	8,701	2,673,041	7,323				
Sarawak	1,529,197	5,030	1,948,044	5,337	2,289,472—	6,273	2,274,043	6,213
Japan	1,542,034	5,072	1,484,962	4,068	1,377,761	3,827	1,575,333	4,375
Egypt	1,024,142	3,369	1,479,037	4,052	1,591,495	4,360	1,742,370	4,760
Ecuador	1,435,295	4,721	1,655,062	4,534	1,622,624—	4,446	1,573,857	4,300
Canada	1,188,891	3,911	1,418,810	3,887	1,147,825—	3,144	1,054,373	2,880
Germany	2,587,358	8,511	2,266,964	6,211	1,712,823	4,692	1,824,019	4,983
France	441,153	1,451	552,000	1,512	552,000	1,515	552,000	1,508
Bahrein			285,071	781				
Others	750,000	2,467	861,000	2,359	432,000	1,184	432,000	1,180
	1,333,998,184	2,388,150	1,502,617,452	4,117,293	1,417,534,489	3,884,022	1,296,712,823	3,544,940



World crude oil production trend by months, 1932–1935. Chart is weighted to compensate for variation in number of days per month. Ratio of U. S. crude production to world production.

MEXICO

LARGE petroleum exports, mostly to the United States, during September, most recent month for which official data on this subject are available, are announced by Ministry of National Economy. Details of the movement, attributed largely to the European war situation, are as follows.

Crude—United States, 245,971 bbl.; Great Britain, 205,619 bbl.; Germany, 148,711 bbl. Fuel Oil—United States, 157,311 bbl.; Great Britain, 74,388 bbl.; Guatemala, 54,552 bbl.; Chile, 18,755 bbl.; New Zealand, 15,284 bbl. Gas oil—Brazil, 58,937 bbl. Great Britain, 42,853 bbl.; Chile, 33,044 bbl.; Gasoline—Great Britain, 104,504 bbl.; Netherland India, 92,371 bbl.; Bahamas, 86,575 bbl.; Guatemala, 8,181 bbl. Lubricants, 27,487 bbl. to Great Britain; and asphalt (metric tons, equivalent)—Australia, 9,230; Great Britain, 6,059; New Zealand, 5,227; Germany, 3,138; Italy, 1,134.

Mexican Eagle Oil Co. (Royal Dutch Shell) has applied to a Federal District Court for an injunction against the ruling of a lower tribunal that it must pay National Railways of Mexico for three tank cars that were burned while being loaded with oil at its Minatitlan refinery, Vera Cruz state.

This company has already obtained an injunction from a Mexico City court against the Ministry of National Economy, refusing to recognize preferential rights to the San Antonio Guanachapa and La Concepcion oil lots in Ixhuatlan and Minatitlan municipalities respectively, Vera Cruz, which it acquired prior to enactment of the reformed federal constitution of 1917 and the petroleum laws of that year. The Ministry contended that the 1917 constitution specifies that the nation owns the subsoil and that therefore these tracts are national property. The Court held that the Ministry endeavors to give the constitution a retroactive interpretation.

President Cardenas has ordered the Ministry of National Economy to afford Mexican and outside capital all facilities the petroleum laws allow for oil exploitations, and to speed the handling of applications for concessions, well drilling, etc.

Commenting editorially upon Mexico's joining economic sanctions voted by the League of Nations as a protest against Mussolini's aggression in Ethiopia, EXCELSIOR, a Mexico City newspaper, says:

"Mexico's petroleum production is increasing. From January to September of this year, it was worth more than 100,000,000 pesos. Now, as we have seconded the League's sanctions, we are to lose a good customer, Italy. But on the other hand, we shall have a better customer, Ethiopia. Fine business."

Earlier this year, Mexico shipped large amounts of petroleum and by-products, especially asphalt, to Italy. Mexican oil exports to Ethiopia are practically nil.

DOUGLAS GRAHAME

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SHIPPING

INTERNATIONAL Tanker Owners Association recently held a general meeting in London. Mr. H. T. Schierwater, Chairman, drew attention to the fact that the accounts for six months to May 3rd, 1935 marked the end of their first year of operation. He also gave further important information concerning the operation of the scheme, pointing out that the average gross registered tonnage laid up per day, taking steamers on the 70 percent basis, was (in round figures) for the first period, 481,000 tons; for the second, 426,000 tons, and for the third 505,000 tons (all the figures for the third period were up to October 1 only).

As the tonnage at present laid up included a large percentage of efficient and economical Diesel vessels, it seemed to him completely certain that without the inducement to refrain from accepting uneconomic rates, they would be cutting each other's throats in their anxiety to get their vessels fixed at any rates in excess of bare running costs.

The tonnage contributing to the pool, in comparison with the tonnage laid up, has been as follows: For the current period, 1.73 to 1; for the second, 1.72 to 1; and for the first, 94 to 1. The low percentage contributing in the first period was, of course, largely due to the fact that during that period a large number of vessels were working on pre-pool fixtures. The estimated contributions receivable during the current period on fixtures notified up to October 1 were £367,000, and that compared favourably with the estimates for the corresponding date (April 1) of the second period, when they were £308,000, and the corresponding date (October 1) of the first period, when they were £222,000; so that although their laid up figures were higher, he had no reason to believe that the results for the current period would not prove satisfactory. The cargo represented by the voyage charter fixtures was: for the first six months period, approximately 3,900,000 tons; for the second 4,800,000 tons; and for the third probably also about 4,800,000 tons. In addition, a considerable amount of cargo has been carried under time charters, and Mr. Schierwater thought he could safely say that their members' vessels were carrying well over 10,000,000 tons of oil per annum on which pool contributions were payable.

One item of interest since they last met has been the voluntary acceptance, by the owners of certain steamers, of a reduction in the rate of laid-up allowance to which they were entitled under the rules. That gesture, he assured the meeting, was appreciated by the Diesel owners, and, taking a broad view, was in the interests of the steamer owners who accepted the cut in so far as it served to consolidate the pool.

During that period tangible help had also been obtained from the Norwegian Government, which had placed certain restrictions on the building of new tonnage, a move that should tend to stabilise their trade to a large extent.

During the year agreements have been made with certain owners, under which seven tankers of approximately 40,000 tons deadweight capacity have been broken up, at least some of which would otherwise have been sold for trading. The council, it was stated, would be glad to discuss similar agreements with any owner. The general basis of such agreements is that if an owner is willing to sell for breaking up, the Association will continue payment of laid-up allowance for an agreed period after the vessel has been broken up.

So far as they are aware, all new vessels building for owners other than the oil companies have, with one exception, been entered in the pool, and there is reason to believe that this vessel, which will not be completed for some 18 months, will be entered in due course.

Record Voyage

THE tanker BINTA is an example of the economy with which modern Diesel tankers

can operate. The BINTA was completed in 1928 on the Tyne, and has two Polar single acting 2-cycle engines with a total output of 2,000 h.p. She recently made a trip from Batum to the New Zealand coast with only one stop at St. Vincent. The voyage was taken via the Strait of Magellan in order to avoid Suez Canal duties. She left Batum on May 4th and arrived at the eastern entrance to the Strait of Magellan on June 11th. The passage of the Strait occupied 42 hours. The master reported that a good deal of heavy westerly weather was experienced during the passage across the Pacific to Auckland, where the BINTA arrived on July 9th, having made the run of 14,326 miles in 65 days and 4 hours, at an average speed of between 9 and 10 knots. Last year the BINTA made a voyage from Constantza to Sydney, via the Cape of Good Hope, in 58 days.

LLOYD'S REGISTER RETURNS show six tankers under construction in Great Britain, a total of 40,710 tons. Included is the large ship for the Anglo-American Oil Company, and vessels for the Anglo-Saxon Company. These figures do not include recent orders made on behalf of the British Tanker Company, upon which work is now proceeding. Few reliable details are available concerning these vessels but it would appear that they differ in size and in power from previous vessels in the fleet. It is reported that single screw propulsion will be employed.

Largest French Tanker

THE question of size and speed of tankers is one which still evokes considerable diversity of opinion among shipping men. In recent construction France seems to be building the largest type of ship and there is now fitting out at Le Trait, on the Seine, a vessel claimed to be the largest in the entire French fleet. The owners are the Cie. Auxiliaire de Navigation Paris, and she will carry oil from the Iraq pipe line to the French refineries. The SHEHERAZADE, as she is named, measures approximately 583 ft. in length overall (554 ft. b.p.), 73 ft. maximum breadth and 40 ft. moulded depth to upper deck. Her loaded draught is 31 ft. and she has a carrying capacity of 18,500 tons. dw. The hull, constructed on the Isherwood bracketless system with two longitudinal bulkheads, provides for one central and two wing compartments, each containing nine tanks. Cofferdams at either end separate the cargo space from the other sections of the ship, and the main pump-room is placed between Nos. 5 and 6 tanks. The loading and discharging system adopted gives independent connection between the pump-room and each of the tanks, and there are two Hayward-Tyler steam pumps, each of 500 tons per hour capacity. The propelling machinery will consist of two four-stroke single-acting six-cylinder Schneider-B. and W. Diesel engines with a total output of 7,500 i.h.p. at 110 r.p.m.; these being designed to give a fully loaded speed of 14 knots.

THE TANKER IN PRACTICE is the title of a new book of interest to oil men by L. R. Anderson and L. H. Morrison, published by Charles Birchall & Sons, Liverpool, at 10/6d. The book is designed to relate to the arrangement, management and maintenance of the liquid-in-bulk carrier. Cargoes, cargo-handling and ballasting operations are explained. Its object is to instruct officers and seamen in tanker service about matters regarding loading, discharging and ballasting. Data usually supplied for application to the problems of these operations are brought to notice and tank cleaning, fire and corrosion are remarked on and explained. The book contains 43 figures and 5 plates. The subject is covered in eight chapters and is practical in its value and application. It is a concise book which executives can confidently recommend to their operating staffs. Good literature on practical tanker problems is not too plentiful, and THE TANKER IN PRACTICE is therefore to be welcomed.

A. C. HARDY

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VENEZUELA

Venezuela Crude Production July and August 1935

Producing Company	July (bbl.)	August (bbl.)
Venezuelan Oil Concessions, Ltd.	6,851,880	6,726,118
Lago Petroleum Corporation	3,882,619	3,919,716
Standard Oil Company of Venezuela	2,061,844	1,940,912
Venezuelan Gulf Oil Company	1,925,034	1,953,548
The Caribbean Petroleum Company	1,347,801	1,331,435
Colon Development Company, Ltd.	796,523	805,630
British Controlled Oil Fields, Ltd.	70,447	70,828
	16,936,148	16,748,187

Crude Oil Exports July and August, 1935

Exporting Interest	July	August
Royal Dutch Shell Companies	4,699,954[1]	4,838,531[3]
Lago Petroleum Corporation	4,057,838	4,142,681[2]
Standard Oil Company of Venezuela	2,271,721	2,510,336
Venezuelan Gulf Oil Company	1,331,373[4]	1,418,608
Arend Interest	226,308	195,516
	12,587,194	13,105,672

[1] Includes 281,440 bbl. of fuel oil, 32,798 bbl. of gas oil and 15,741 bbl. of gasoline.
[2] Includes 202,261 bbl. of fuel oil and 17,047 bbl. of gasoline.
[3] Includes 97,372 bbl. of fuel oil.
[4] Includes 82,540 bbl. of fuel oil.

The Standard Company of Venezuela has completed the installation of light beacons along the San Juan river, so that navigation to its port of Caripito can now be effected at night, thus materially increasing its shipping capacity from that port. During the month of August the same company commenced shipments from the new port of Guiria, on the south side of the Paria peninsula, state of Sucre. The company has likewise installed its third submarine loading line. It is a 14 in. line, 7,000 ft. long, and connected with the buoys.

During August the government transferred its custom house from San Cristobal to Guiria, which relieves loaded tankers from stopping at the former port.

Colombia

WORK proceeded at both the Petrolea and Oro locations during July and August, but with no developments of special interest. The rainfall was heavy during the former month, amounting to 20 in.

The Motiloni Indians were more active and hostile during that month. Two laborers were attacked and wounded with arrows near the Puerto Barco camp of the Gulf company, one dying of his wounds. The Indians also sent a flight of arrows at boats of the Colombian-Venezuelan Boundary Commission, causing slight injuries. The attack was repeated on other occasions and although the savages were beaten off with gun fire, work had to be discontinued, as laborers were wounded and the party lost some provisions and equipment.

C. N. CLARK

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Correction

IN THE October issue of WORLD PETROLEUM, three photographs of refinery units were published on pp. 562, 563 and bottom of p. 565. These three units were Foster-Wheeler installations, though the captions did not make this clear. WORLD PETROLEUM sincerely regrets this oversight and takes this opportunity properly to credit Foster-Wheeler.

World Petroleum Abstracts

Summaries of the Most Important Articles as Published in the Oil Press of the World Dealing With Technical and Economic Aspects of the Industry. *Edited by Dr. O. W. Wilcox*

Petroleum Geology

AREAL GEOLOGY OF EOCENE IN NORTHEASTERN MEXICO.—Wm. G. Kane and Guy B. Gierhart, in BULL. AM. ASSOC. PETROLEUM GEOLOGISTS, vol. 19 (1935), No. 9, pp. 1357–1388.

The Eocene contacts as they appear along the Rio Grande in Texas have been traced southward into Mexico as far as the Rio San Juan. A stratigraphic reconnaissance has been made which correlates some of the results of several rather extensive and detailed mapping operations carried on by the writers during the past seven years.

Cross sections at six places along the belt covered by the outcrop of these beds reveal a progressive thickening toward the south of the Midway and Wilcox sections exposed. The Carrizo sandstone is shown to be thickening rapidly toward the south as far as the Monterrey-Laredo railroad from which point a marked thinning is noted toward the south. The Mount Selman becomes much thicker toward the south and is characterized by more sandstone beds than it has in the border province of Texas. The Yegua and Fayette formations also have more sandstones here than in Webb and Zapata counties, Texas, but these begin to thin toward the south and many of them disappear before the Rio San Juan is reached.

INSOLUBLE RESIDUE METHODS AND THEIR APPLICATION TO OIL EXPLOITATION PROBLEMS.—G. E. Burpee and W. L. Wilgus, in MINING AND METALLURGY, vol. 16 (1935), No. 346, pp. 418–420.

A comprehensive study of insoluble residues in the productive Permian limestone in the Hobbs and Eunice fields, Lea County, N. M., has been conducted by Shell Petroleum Corp. engineers during the past two years. This study was prompted by the belief that the stratigraphy of the producing formation might be worked out in detail and that some relationship might be established between the permeable oil, gas, and water zones and correlated lithologic horizons within the productive formation. As a result of the study, correlations have been established which have proved of great value to both an orderly development and corrective program.

For this investigation use was made of rotary drill cuttings which were collected over intervals of from 5 to 20 ft. In conducting the laboratory work, the cuttings were first carefully washed to remove foreign material that might be present, and then were dried and weighed. The weighed portions were transferred to 250-c.c. beakers and digested in dilute hydrochloric acid until all carbonate fragments were dissolved. Remaining insoluble fractions were also washed, dried, and weighed, and the percentage residue calculated. In addition, the residues were examined under a binocular microscope, carefully described, and the percentage of each mineral estimated.

Thus, data from both qualitative and quantitative determinations have been used in preparing well logs. Data from the former are incorporated in the lithologic section of the well logs and represented by appropriate symbols, whereas the percentage residue is recorded at the side of the column by means of a curve. The problem of correlation, therefore, involves a study and comparison of the residues and the corresponding points on the percentage curves.

GAS, OIL AND SAND ERUPTIONS IN THE PECHELBRONN MINES.—J. Loislau in C. R. GROUPE GEOL. PETROLIERS STRASBOURG, vol. 3 (1935), No. 3.

At the Pechelbronn mines in France, where oil is recovered by underground workings, there are occasional outbursts of gas, oil and sand from the working faces of the deposits. This occurs when the drills encounter a pocket of oil under pressure of gas. In one such outburst 350 cubic meters of sand were projected, costing the lives of four men. The danger, however, is more or less removed by precautionary borings both in the galleries and from above, so that in four years of operation, during which 200 kilometers of galleries have been excavated, the risks are considered much below those of coal mining.

Drilling

VISCOSITY AND THIXOTROPY OF DRILLING MUD.—P. Evans and A. Reid, in JOUR. INST. PETROLEUM TECHNOLOGISTS, vol. 21 (1935), No. 142, pp. 677–690.

Thixotropy is defined as that property of drilling muds, especially those that have received extensive chemical treatment, by which the mud gradually sets to a jelly-like mass, but will return to a mobile state if agitated and again set to a jelly if allowed to remain undisturbed. The existence of this property greatly complicates viscosity measurements.

The thixotropy of markedly thixotropic muds may be measured by filling test tubes and observing the time that passes before the tubes can be inverted without spilling the contents.

Thixotropy in a mud has both advantages and disadvantages. A thixotropic mud combines some of the properties associated with high and low yield values, and there are occasions when one or the other of these properties may be very useful. On the other hand, very thixotropic muds have disadvantages, as when long strings of casing are being run. If in such cases a string of 8,000 or 9,000 feet of casing requires a day or more to run, the mud might take such a firm set that it would be impossible to break circulation when the string has reached bottom. There are several instances on record where long strings of casing have been lost for this reason, with direct money losses approximating $100,000 and more.

As stated, chemically treated muds are especially liable to exhibit thixotropy; a thin mud consisting of an ordinary clay and water is unlikely, on its own, to set to a gel, but the tendency to go thick is much enhanced in the case of a bentonitic clay mixed with water, and this tendency exists with most heavily "treated" muds.

HARDENING DRILLING BITS WITH METALLIC BORIDES.—M. C. Smith, in PETR. ENG., vol. 6 (1935), No. 13, pp. 46–48.

Metallic borides with a hardness of nine on Moh's scale (rivaling the diamond) are now available for hard-facing drilling bits. The product is sold under the trade name of "Colmonoy", and is practically insoluble in all acids.

PREVENTION OF DRILL PIPE FAILURES.—J. E. Brantly in PETROLEUM WORLD, Annual Review, 1935, p. 210.

The most prevalent types of drill-pipe failure are here summarized:

Firstly, lines or planes of weakness developed during the machining of the threads on the drill pipe and consequent early failure or "thread breakoffs" when placed in service; secondly, failures or "breakoffs" due to fatigue caused by universal joint action in the drilling string; thirdly, fatigue failures or "breakoffs" caused by the shock due to the too rapid application of weight to the bit or drilling shaft; fourthly, fatigue failures or "breakoffs" caused by what is termed "stall-shock"; and fifthly, "twistoffs" caused by subjecting the drilling shaft to more torque than it can withstand, regardless of whether it be new or old pipe. The counter measures recommended are:

Firstly, by using properly designed threads with the tool joints and collars fitting thereon so as to leave, after the joint is properly and finally made up, a minimum of exposed full threads, while further protection for the stand-off threads may be obtained by a machined fit of the recess or shoulder of the tool joint or collar against the drill pipe or by shrinking these connectors onto the pipe; secondly, by using adequate excess weight in the drill collar over that to be supported by

the bit, with perfect balance in weight distribution and concentricity in drill collars, tool joints and drill pipe, and a straight drilling shaft; thirdly, a perfectly smooth and uniform rate of feeding that at no time will slip off more weight than the maximum allowable based on the weight of the drill collar; fourthly, by using a prime mover for rotating the drill pipe having a minimum necessary power capacity for the job to be done and a minimum of heavy rotating parts in which energy might be stored at normal drilling speeds and released when the bit stalls on bottom, together with heavy drill collars to store energy at the bit end; and, fifthly, by limiting the prime mover in power output to that torque equivalent which the drill pipe, whether new or old, can safely withstand.

Mechanical and Metallurgical Aspects of Present Day Oil-Production Equipment.—Albert G. Zima, in METALS TECHNOLOGY, August, 1935, T. P. 633.

According to recently published statistics, it is predicted that as much oil must be produced during the next 16 years as has been produced during the past 75, in order to satisfy the high rate of consumption of petroleum products. During 1934, over 17,000 oil wells were completed in the United States, and it is expected that over 20,000 additional wells will be drilled during the current year.

Were it not for the remarkable progress made during recent years in the improvement of drilling technique and in the development of equipment used in the production phase of the oil industry, it is doubtful whether sufficient oil could be produced to meet present requirements. A few years ago, wells seldom were deeper than 3,500 to 4,000 ft., owing to the limitations of the drilling methods and equipment employed. Today, however, through the application of scientific drilling methods and the adaptation of modern equipment and improved materials, many wells range from 6,000 to 8,000 ft. in depth, and a few recent completions exceed 10,000 feet.

This paper outlines chiefly the metallurgical aspects of the equipment which has made possible the present volume of oil production and discusses design of new equipment and selection and adaptation of materials.

Oil Well Operation

Sucker Rod Failures.—W. R. Shimer, in OIL & GAS JOUR., vol. 34 (1935), No. 16, pp. 48–50.

This paper demonstrates that sucker rod failures are often traceable to incorrect oil field practice. Among faulty practices listed is lack of careful balance of the pumps. Crooked holes may cause knicking or other damage when a string is pulled or run. High momentary overloads will start a rod on the way to fatigue failure. The metal, of course, may be of faulty composition. Aside from original defects and careless handling, outstanding causes of rod failure are ascribable to corrosion in one form or another.

The author notes a curious circumstance, said to be authentic, where rods taken out of a bad sulphide well in Kansas were so brittle that they broke in being laid down on the platform, but after exposure to the air for three weeks they could be bent through an angle of 180 degrees. On the basis of such incidents he advises that if rods working in hydrogen sulphide wells be removed, say once a month, and given a low annealing, more life could be obtained from them.

More to the point is the experience of a Mid-Continent oil company that was having 60 breaks a month, but by a systematic study of bad practices it was able to school the field crews to a point where the average number of breaks was reduced to nine.

Estimation of Petroleum Reserves in Prorated Limestone Fields.—P. P. Gregory in MINING AND METALLURGY, vol. 16 (1935), No. 346, pp. 421–423.

At this time, no positive methods of estimation of petroleum reserves in prorated flush limestone fields are available owing to the peculiar character of the limestone reservoir, which lacks the relative uniformity of porosity and permeability found in sand fields. Predictions of per-acre recoveries in a new field based on recoveries obtained in "similar" older limestone fields may be highly erroneous.

Experimental data indicate that in fields under volumetric control, Coleman's formula may be used to obtain reliable estimates of the amount of oil originally present in the reservoir. The formula is also applicable for determination of recoverable oil, provided the average gas-oil ratio can be closely controlled.

Where such close control is lacking, the amount of recoverable oil can be estimated from the analysis of total recovery of fluids and corresponding decline in the average reservoir pressure.

In fields under hydraulic control, estimate of recoverable oil and of oil in place can be had from study of withdrawals made and of rise in oil-water contact, together with changes in extent of the gas cap.

Oil Production at Pechelbronn.—J. Berghaus, in PETROLEUM, vol. 31 (1935), No. 35, pp. 10–16.

This paper, by a former chief engineer of the Pechelbronn oil mines in France, gives a description of the mining methods employed in working these deposits. (This account may be of practical interest in view of attempts now being made in East Texas to work shallow oil formations by mining methods. ED.)

Cleaning Intake Wells.—J. C. Albright, in OIL WEEKLY, vol. 79 (1935), No. 2, pp. 24–26.

Oil producers who operate "flood" properties in the Bradford field, Pennsylvania, are finding that one of the most important items to consider in such operations is the quality of the water injected into the sand. It not infrequently occurs that the water will deposit an impermeable film on the sand face, which builds up such a resistance to the flow of water that the input rate is greatly reduced. When such a condition arises it is necessary to remove this film. This is done by admitting a small quantity of hydrochloric acid into the bottom of the well and washing it out again. One company uses alternate washing with acid and with soda ash and water glass.

To obtain water that is clean enough to use in the intake flood wells, it is necessary to treat it with lime, in one tank, and run it to another to permit enough time for the impurities to settle out. After this is done, filters are used to remove approximately all the remaining matter that might fill the pores in the face of the sand in the shot hole. Even with these precautions, the wells eventually will become so tightly bound on the sand face that cleaning is necessary.

Laboratory Investigations on Acid Treatment of Oil Sands.—F. B. Plummer and R. B. Newcome, Jr., before Petrol. Div., Am. Inst. M. & M. Engineers, Houston, 1935.

The practice of introducing acid into oil wells to increase production has long been known (since 1894). Under some circumstances it proves successful, under others not. The authors have made some laboratory experiments on the acid treatment of cores, which have given certain results somewhat at variance with the usual conception.

The experimental method employed consists in cutting a four-inch core of the formation with a special core-cutter drilling a ¾ in. hole lengthwise through its center, placing the core in a radial permeability apparatus and measuring the rate of flow of kerosene through the core at measured pressures. The core is then treated with acid, and its permeability is again measured under exactly similar conditions. In these tests the acid treatment was repeated several times with different strengths and amounts of acid, and the different rates of acid penetration and the permeability were again measured. The results were calculated in darcys by Muskat's formula.

The results of the experiments show clearly that acid treatment of fine-grained cores results in a large loss in permeability. This loss appears to be due to clogging of pores by very fine and insoluble residues, which under the microscope show fine, needlelike crystals of acid-insoluble silicates mixed with a little colloidal silica and traces of colloidal organic matter. In cores in which the interspaces are less than 0.01 mm. in diameter, the insoluble residue resulting from the solution of limestone clogs up the pores and definitely lessens the flow of liquids through them. The effect of this insoluble colloidal and crystalloidal material on the permeability varies with the texture of the porous rock.

It is suggested that in some cases production may be increased by treating the well with some solvent other than acid, as benzene, which will dissolve out any paraffin that may be clogging the pores of the sand. In any case, careful study of cores should precede decision as to method of treatment.

Plug-Back Cementing Methods.—C. P. Parsons, before Petrol. Div., Am. Inst. M. & M. Engineers, Houston, 1935.

This paper relates to cementing operations for shutting off bottom water, whipstocking operations and other related purposes. Representative methods are selected for discussion. Among these are the "balanced" method of plugging back, the displacement method, simple plugging, squeeze jobs, plugging back in "thirsty" formations and plugging back in screens or perforated liners. Each is described in terms of practical experience by an expert in well cementing.

Summarizing the above, in order to get the

most successful results from plug-back operations, it is necessary first to condition the well for the job, select the method that appears most suitable for the conditions in the well, add a quantity of cement slurry for donation to the hole as a scavenger, circulate the excess cement out of the well and determine the location of the actual top level of the plug-back before resuming operations. Aside from the purpose of shutting off bottom hole water, some of the above methods have been very successful in plugging-back for side-tracking and other purposes.

The necessity of first ascertaining conditions at the bottom of the hole and of thoroughly cleaning it out is emphasized.

Petroleum Refining

Materials used in Oil-Refinery Pumps.—A. E. Hornsberger, in METALS TECHNOLOGY, August, 1935, T. P. 631.

Practically every operation in an oil refinery involves a pumping operation, in which temperatures may vary from −50° F. to 900° F., and pressures from subatmospheric to 2,000 lbs. per square inch. Some of the products to be pumped are corrosive, others are noncorrosive. Abrasion is a factor to contend with when handling products containing coke or slurries made up of fuller's earth, copper oxide, etc. The choice of a pump of the right construction for a particular job therefore involves consideration of a large variety of circumstances.

In making such a choice refinery engineers and designers of refinery equipment will do well to consult this paper, which is too detailed to be abstracted. The author has thoughtfully provided a glossary of trade names and terms for the materials that come into consideration.

Use of Steel Alloys in the Petroleum Industry.—K. Bischoff and Wm. Jamm, in OEL UND KOHLE, vol. 11 (1935), No. 36, pp. 658–662.

The authors conclude this paper with the statement that the question of suitable material for tubes and other equipment for the petroleum industry can be regarded, in general, as solved. It is stated that the German steel industry is now producing the necessary special steels and is now in the forefront of progress in meeting the conditions of the latest processes of the oil technologists. For drilling rods there are now offered alloys with varying proportions of copper, chromium, molybdenum, manganese, silicon and nickel, but with not more than 2.5 percent of total alloy metal. With the Cu-Mn-Cr-Si alloys it is possible to attain elastic limits of 50 kg/sq. millimeter.

The carbon steels used in America for cracking tubes correspond to what is known in Germany as "age resistant" steels. Investigation is said to have shown that the American product is hardly equal to the German grade, which has stood up as long as two years in practical use. For the hottest part of the cracking stills the most suitable product is a non-rusting austenitic steel with 18 percent Cr, eight percent nickel and small amounts of carbon and titanium. The non-rusting steels with a higher carbon content used in America for this purpose become brittle. It is stated that this does not happen with the special German steels. Various particulars of current practice to meet particular needs are specified.

As regards containers for holding compressed gaseous fuel (butane, propane), the British have developed medium alloyed Cr-Ni-Mo steels wherein the total of the alloy metals amounts to nearly five percent; in contrast thereto the German tube industry is said to have developed steels for the same purpose with not more than 1.5 percent of alloy metals.

Fractionation of Oil Residues and Heavy Oils by Compressed Gas.—S. von Pilat, in OEL UND KOHLE, vol. 11 (1935), No. 36, pp. 655–662.

The author took occasion to revive an old Polish patent based on the insolubility of asphalt in the lighter hydrocarbons. When an oil residue is treated with a mixture of propane and butane, asphalt is precipitated. The asphalt-free solution is distilled off and the non-volatile oil remaining behind is dissolved in propane alone, and methane is forced into the propane solution under pressure. This results in the precipitation of a series of heavy oils. Typical results obtained with a Venezuelan residue are shown in the table below.

Pressure	Quantity in grams	Yield, %	Specific Gravity
8	2,125	49.4	
30	336	7.8	1.004
40	257	5.95	0.9885
50	293	6.8	0.9665
60	204	4.75	0.9535
70	238	5.55	0.9455
80	169	3.95	0.9365
90	157	3.5	0.9300
100	123	2.85	0.923
130	135	3.15	0.9145
Rest	85	2.0	0.906

An experiment was made to see whether the selective action of methane could be increased by addition of cresol. It was found that three layers were obtained. The lowest was a saturated cresol solution of aromatics, the middle layer consisted chiefly of heavy hydrocarbons, and the upper of propane and methane with small quantities of oil and cresol. Whether this fact can be technically utilized is not decided.

The author notes that similar work has been done in other countries, but that little or no use seems to have been made of methane in this connection.

Octane Number of Doctor-Sweetened Naphtha Improved by Re-running.—George M. Woods, in REFINER, vol. 14 (1935), No. 10, p. 479.

During a recent investigation on doctor sweetening East Texas crude naphtha by the sodium plumbite method, it was observed that rerunning after sweetening improved the octane number about four points over rerunning followed by doctor sweetening. These results have been carefully checked and as the discussion shows, the octane number improvement is quite marked. The four point rise in octane number is worth 7/8¢ per gallon as 62.5 octane number gasoline is listed at 4¾¢ per gallon, while 66.4 octane number gasoline is listed at 5⅝¢ per gallon. (September 19, 1935.) A plant handling 10,000 barrels per day of crude naphtha could thus make $3,375.00 per day more by rerunning their doctor sweetening crude naphtha, on an octane number differential basis, over and above the cost of rerunning at 3¢ per barrel.

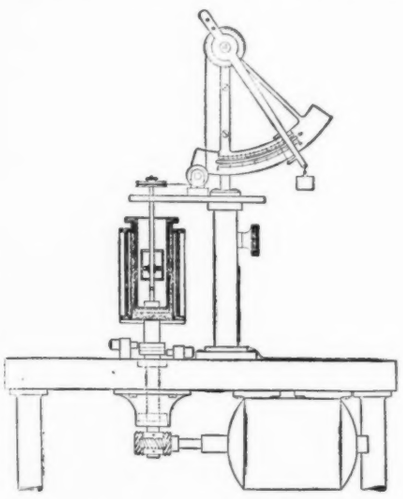
Asphalt and Tar

Recovering Oil from Bituminous Sand.—K. A. Clark, in OIL WEEKLY, vol. 27 (1935), No. 27, pp. 30–36.

Bituminous sands containing 8 to 15 percent of a very viscous asphaltic oil occur over an area of a thousand square miles in northern Alberta along the Athabaska river from McMurray northward, where these sands are seen as cliffs 100 to 200 feet high along the banks of the main and tributary rivers. Certain parts of the formation, representing a very large tonnage, can be mined in open cut workings and the oil extracted by treating the oil-sand mixture with hot water. Addition of soda ash to the solution is necessary to prevent foaming. Semi-commercial operations have shown the practicability of this extraction and plans for full commercial development are under way. The bitumen produced has been used in road construction and as a constituent of asphalt paint, roofing pitch and similar products.

Qualifying Road Bitumens on the Basis of Their Absolute Viscosities.—Jozesf Csagoly, in ASPHALT UND TEER, vol. 35 (1935), No. 33, pp. 667–672; No. 34, pp. 687–690.

It is now definitely recognized that mineral oils and tars are very closely related substances and that the "apparatus and the principles which have proved their worth in the testing



of mineral oils may be used, with appropriate modifications, for the testing of bitumens."

Chief among the significant properties of both oils and bitumens is the absolute viscosity. This property is the basis of the qual-

ities of softening point, penetration and ductility which are generally held to indicate the value of a bitumen for road construction purposes. Hence a measure of the absolute viscosity of a bitumen will include a measure of the three qualities under consideration.

For measurement of the absolute viscosity of bitumens use is made of the apparatus shown in the accompanying sketch. It consists essentially of two upright concentric cylinders, between which a sample of the bitumen to be tested is placed. The outer cylinder can be warmed electrically to a definite temperature. The inner cylinder is mounted on a vertical shaft which can be rotated at a definite speed by means of a motor placed under the table. As the inner cylinder rotates, the motor must overcome the friction of the bitumen and a braking force applied by a swinging arm, as shown in the diagram. The amount of this braking force required to bring the inner cylinder to a stop is a measure of the absolute viscosity of the substance.

The machine is calibrated to show absolute viscosities in poises. Two measurements, at two different temperatures, are sufficient to determine a curve that gives a description of the substance that would otherwise require a long series of separate tests. Both the time and the cost of specification tests are thus greatly reduced.

Petroleum Chemistry

Disulphides and Motor Fuel Susceptibility to Tetraethyl Lead.—W. A. Schulze and A. E. Buell, in NAT. PETROL. NEWS, vol. 27 (1935), No. 41, pp. 25–31.

This paper describes a research that was prompted by the case of a gasoline with an abnormally low original octane number and an unusually low response to tetraethyl lead. Most of the sulphur in this gasoline was found to be in the form of methyl and ethyl disulphides. The authors then undertook a general investigation of sulphur compounds in gasolines in relation to tetraethyl lead treatment. It was found that in this connection the disulphides (except carbon disulphide) are the most harmful, followed by the sulphides; thiophene, an example of cylic sulphur, is the least objectionable. The action of disulphides is of especial interest, because in the common practice of sweetening gasoline the mercaptans are converted to the disulphide form, the very worst type of organic sulphur, and consequently the amount of such sulphur left in the gasoline becomes of practical importance.

From the practical refinery standpoint the most interesting phase of the matter is that a moderate desulphurizing of a sweetened gasoline has a more than proportional effect on the susceptibility of the gasoline to improvement by tetraethyl lead. For example, it is noted that when the non-cyclic sulphur of a cracked gasoline was reduced from 0.086 to 0.072 percent, the lead requirement was reduced to 0.65 cc. per gallon, a saving of 42 percent; in the cases considered the lowest saving was 30 percent.

This discovery disturbs the accepted conclusion that the sulphur compounds left in the gasoline by the sweetening process are innocuous because they do not have the smell and corrosive quality of the mercaptans from which they have been formed. It also raises the question of desulphurizing, at least partially, the sweetened gasoline, an operation that might be regarded as putting a tremendous burden on the refining industry. Yet the data here reported indicate that desulphurization brings about substantial savings, once the deleterious effects of the easily removable sulphur compounds on lead response are properly evaluated. Expressed another way, if all motor fuels were moderately desulphurized, octane numbers could be raised three or four units universally with no greater cost for lead than at present.

The discovery and evaluation of the deleterious effects of sulphur compounds on the head response of motor fuels, should result in a renewed interest in old and new processes which remove sulphur from gasoline economically and conveniently.

The Thermal Process for Polymerizing Olefin-bearing Gases.—M. B. Cooke, H. R. Swanson, and C. R. Wagner, before Am. Petrol. Inst., Los Angeles Meeting, 1935.

Polymerization of normally gaseous hydrocarbons has been studied in the laboratory for a quarter of a century, and is now being employed commercially to produce gasoline and aromatics. Motor fuel of a higher octane rating can be produced by polymerization than by any other accepted method of refining petroleum. The two commercial methods consist of the "thermal" process, wherein heat and pressure are employed to effect the reaction, and the "catalytic" process in which some heat is used but in which the reaction of polymerizing is accelerated by catalysts. At the present time several thermal plants are in successful operation, whereas only one commercial unit of the catalytic type has been operated. Both types of plants effect a union of unsaturated hydrocarbons, normally gaseous, to form a liquid boiling within the motor-fuel range. The octane value of the polymer product ranges from 78 to 110 when tested by the ASTM method. The blending value of the polymer is very high. The thermal process converts ethylene as well as propylene and butylene into polymer, whereas the catalytic methods so far made available do not polymerize ethylene to any great extent. Several different systems of the thermal process are described and data given.

The authors estimate that polymer gasoline can be produced in this country at a cost not exceeding five cents a gallon at the present time. It is also evident to them that in the production of highly-aromatic polymer distillate, we have the cheapest source of aromatics so far available. The general conclusion is that as regards the economics involved, polymerization is an attractive process for refiners. A long list of United States and foreign patents, and a still longer list of literature references are appended.

Separation of Hydrocarbons by Means of Silica Gel.—Beveridge J. Mair and Joseph D. White, in OIL & GAS JOUR., vol. 34 (1935), No. 18, pp. 29–32.

In this article the authors discuss fractionation by filtration through columns of silica gel, of a number of binary mixtures of pure hydrocarbons boiling between 80° and 175° C. Two important results of these experiments show that (a) the aromatic and olefin hydrocarbons may be removed from the paraffin and napthene hydrocarbons; (b) the capacity of the silica gel as an absorbent was found to depend on the concentration of the solution and to some extent on the components of the solution from which the aromatic hydrocarbon is being adsorbed.

The degree of separation is determined by observing changes in the refractive index of the filtrate; from the practical standpoint the method should prove a useful tool in the investigation of the composition of petroleum distillates.

Petroleum Physics

Quantitative Measurement of the Fluoresence of Mineral Oils.—F. Evers, in OEL UND KOHLE, vol. 11 (1935), No. 37, pp. 746–748.

The quantitative measurement of the fluoresence of a mineral oil has now been made very simple and accurate by the use of the Zeiss stage-photometer. This instrument allows of constructing a curve of five points showing the condition of the oil at a given moment. If by aging or use the oil undergoes internal changes, a redetermination of the curve will reflect these changes. For instance, the curve of a transformer oil has a distinct correlation with the electrical value of the oil which makes it easy to determine the point where a transformer oil becomes unusable.

The use of the instrument in following the effects of artificially aging an oil is especially interesting. The author quotes the following data:

Method of Aging	Color Depth	Intensity
Fresh oil	+0.13	11.0
600 hrs. at 100° with O_2	−0.05	6.5
300 hrs. Swiss test	−0.11	3.7
100 min. oxidizer, 100°	−0.23	4.2

In practical work one frequently obtains values equivalent to those obtained in the oxidizer test. This affords another means of judging how accurately the natural aging process can be imitated in the oxidizer.

Classification of Lubricating Oils.—Eva Neyman, in MOTORENBETRIEB UND MACHINEN-SCHMIERUNG, vol. 8 (1935), No. 9, pp. 2–6 (Petroleum, vol. 31, No. 36).

It is here shown that the quotient of molecular weight divided by the specific gravity is a special characteristic of a lubricating oil and is usable as a means of classifying such oils.

Further, from the known fact that the viscosity of an oil belonging to a certain hydrocarbon series increases with increase in molecular weight, and from the observed effect of the influence of the molecular weight on the temperature-viscosity curve, there is set up the formula

$$W_{t_1}^{t_2} = \frac{M \cdot v_1}{d \cdot (v_1 - v_2)}$$

from which it is possible to assign the oil a certain number, $W_{t_1}^{t_2}$, which depends only on the density, the molecular weight and the vis-

cosity at two different temperatures. In this formula M is the molecular weight, d the density, v the viscosity in centistokes at the temperature t_1, and v_2 the viscosity in centistokes at the temperature t_2.

This characteristic number $W_{t_1}^{t_2}$ contains neither arbitrary assumptions nor conventional units, and involves no complicated calculations. The temperatures t_2 and t_1 will naturally not be the same for light oils as for heavy oils on account of the differences in temperature viscosity curves.

Relation Between Ignitability and Physical Properties of Brown Coal Diesel Distillates.—Richard Heinze and Max Marder in OEL UND KOHLE, vol. 11 (1935), No. 36, pp. 724–728.

Between the ignitability (cetene number) of Diesel oils from brown coal distillates of the same boiling characteristics, and several other physical constants such as parachor and density, there is a nearly linear relation. From this relation it is possible to calculate the cetene number. However, for brown coal distillates containing creosote, a correction has to be applied for each one percent of creosote present. The cetene numbers calculated in this way, and cetene numbers deduced from actual tests, agree within less than one unit. The physical constants chiefly involved are density, surface tension, refractive index and boiling number.

Petroleum Reserves

Estimation of Developed Petroleum Reserves.—M. Albertson, before Petrol. Div., Am. Inst. M. & M. Engineers, Houston, 1935.

The author points out that with the advent of curtailment, the problem of more accurate estimates of developed petroleum reserves has become acute. The three principal reasons for this acute state are that the method of estimation depending on production decline curves is inapplicable under curtailment; that the retarding influence of wide open conditions on over-development is absent, involving risk of great losses of capital before the true situation is recognized; that as above-ground stocks have diminished it is increasingly necessary to know accurately the amount of oil in the natural underground reservoirs.

In considering a revision of the method of making estimates under these conditions, the author brings into view a large number of factors that have an influence. To explore each of these separately would be a Herculean task, but the whole may be reduced to a few groups and the problem thus brought within a practicable range. Thus, the information desired might be obtained by working along one or more of the following lines:

1. Fractional part of total energy consumed per unit of oil recovery.
2. Determination of oil recovery per unit retreat of oil from oil reservoir plus more accurate estimation of reservoir size and content. (Water surveys, gas surveys, electrical logging of formations, better core recovery, etc.)
3. Rate of reservoir pressure decline per unit of oil recovered, and influence of rate of recovery upon total recovery.
4. Oil recovery per A. P. I. gravity unit under reservoir conditions of temperature and pressure.
5. Average gas-oil ratio and rate of variation per suitable time unit for life of field.
6. Combinations of the above factors pertinent to the particular field.

Estimation of Petroleum Reserves in Prorated Limestone Fields.—P. P. Gregory, before Petrol. Div., Am. Inst. M. & M. Engineers, Houston, 1935. (MINING AND METALLURGY, Oct., 1935.)

At this time no positive methods of estimation of petroleum reserves in prorated flush limestone fields are available, owing to the peculiar character of the limestone reservoir, which lacks the relative uniformity of porosity and permeability found in sand fields. Predictions of per-acre recoveries in a new field based on recoveries obtained in "similar" older limestone fields may be highly erroneous.

Experimental data indicate that: (1) In fields under volumetric control: (a) Coleman's formula may be used to obtain reliable estimates of the amount of oil originally present in the reservoir. The formula is also applicable for determination of recoverable oil, provided the average gas-oil ratio can be closely controlled. (b) Where such close control is lacking, the amount of recoverable oil can be estimated from the analysis of total recovery of fluids and corresponding decline in the average reservoir pressure. (2) In fields under hydraulic control: Estimates of recoverable oil and of oil in place can be had from study of withdrawals made and of rise in oil-water contact, together with changes in extent of the gas cap.

Impending Shortage of Petroleum.—L. C. Snider and B. T. Brooks, before Am. Chem. Soc., San Francisco meeting, August, 1935.

The authors raise the frequently discussed question of the eventual, if gradual, disappearance of the petroleum supplies of the United States. The chief point they make is that a distinction is to be drawn between *exhaustion* and *shortage*. No one doubts that at some future time the store of underground petroleum must approach, if not reach, exhaustion. But long before the extreme condition of exhaustion is attained we shall experience a shortage, meaning an insufficiency of supply to meet all demands. Viewed from this angle, the essence of the question is: when will the condition of shortage arrive? They foresee that within five to eight years the supply will dwindle to a point that will necessitate a marked increase in our imports and an increase in the petroleum price structure.

This manner of approaching the subject puts the matter of the extent of our petroleum reserves in a different perspective. Much effort has been put forth by various authorities to ascertain how much petroleum is still in the ground, and there is little doubt but there is enough to postpone ultimate exhaustion for 50 years. But this is misleading from the economic standpoint, because it looks only toward the end and tends to overlook the middle. There is no known production method that will make all this oil immediately available, and demand will crowd upon the heels of production and bring on a shortage.

As a result of this impending condition the authors foresee an increase in importations from South America and possibly other fields, and eventually an increasing resort to substitutes, but they doubt that manufacture of petroleum from coal will be sufficiently practicable. In any case, higher price levels are in prospect, with an inevitable shift in present refinery economics.

A Method of Estimating Oil and Gas Reserves.—D. L. Katz, before Petrol. Div., Am. Inst. M. & M. Engineers, Houston, 1935.

A method of calculating the initial oil and gas content of reservoirs based on oil and gas production data and properties of crude-oil-gas mixtures is presented and shown to be applicable to the present problems of the industry. The data required for calculating the initial quantity of oil and gas present in a reservoir are bottom-hole temperatures and pressures, oil and gas production figures, solubility and shrinkage curves of the reservoir crude oil, and deviation of reservoir gases from the ideal gas laws. The need for gas measurements on producing oil pools is stressed by the place that gas volumes play in the calculations. The initial content of a reservoir gives the gas reserves directly and provides a more reliable method for estimating oil reserves. The application of the described principles allows the calculation of the future reservoir pressure for a given oil and gas production

An analysis of an oil reservoir by a method similar to the one described in this paper not only enhances the estimation of oil and gas reserves, but it gives a clearer understanding of the reservoir and well behavior by virture of the information made available in solving the problem.

Oil Uses

Cathode Ray Tube for Testing Diesel Fuel Oils.—Anon., OIL & GAS JOUR., vol. 34 (1935), No. 21, pp. 26–27.

There is a popular, but erroneous, impression that any sort of petroleum product heavier than gasoline is a suitable fuel for oil engines, but this is far from the truth. The separate actions that go on in a Diesel engine cylinder occur within exceedingly short spaces of time, a few hundredths or thousandths of a second, and the oil must have such a character that it will fulfill its role within that time, otherwise there will be a loss of efficiency, accompanied by waste of oil, smoky exhaust, or destructive knocking. In particular, the "igniting time", or time required for the flame to start and propagate through the charge in the cylinder, must be just right. If the igniting time is too short the initial pressures may be excessive; if too slow, an excessive amount of fuel accumulates in the cylinder and there will be heavy combustion shock and risk of engine trouble.

To assist in selecting Diesel oils of the right burning characteristics, the research laboratory of the Anglo-Iranian Oil Co. has developed the Sunbury electrical indicator for observing the performance of these oils in the combustion

chamber under actual working conditions. The apparatus consists in the main of a cathode ray tube of the type developed for television purposes. With this apparatus it is possible to obtain diagrams showing pressure changes in the cylinder, velocity of atomizer, and valve lift, which disclose the character of the oil in service. Besides this, the apparatus may be employed for investigating other phenomena arising in the operation of high speed engines.

THE NAPHTHENIC ACIDS.—Yoland Mayer, in ACTUALITE CHIM. IND., vol. 34 (1935), No. 3, pp. 526–529.

This paper (in French) is a useful summary of present knowledge concerning naphthenic acids and their industrial utilization. The author digests a considerable number of American and foreign patents and other literature on the subject.

The chief industrial source of these acids is the residue obtained in the purification of lubricating oils. Their principal uses are based on their antiseptic and siccative properties, and on the detergent action of some of their salts.

CHASSIS LUBRICATING GREASES.—Ralph R. Matthews, before Am. Petrol. Inst., Los Angeles meeting, 1935.

Even though chassis lubricating greases manufactured in 1934 reached a quantity of over 200,000,000 lbs., it should have been larger if all automobiles had been greased at proper intervals with the correct lubricating greases. Stressing the increased factor of safety in driving well-lubricated cars would be a public service, and would also increase consumption of lubricating greases.

Attention is called to changes of chassis equipment which have influenced and are influencing the type and grade of chassis lubricating greases now manufactured.

A semi-fluid pressure-gun grease suitable for all kinds of shackles is now generally manufactured. Abbreviated specifications of various types are given.

The tendency in wheel-bearing grease is toward one having non-corrosive extreme-pressure properties, so that trucks, buses, and passenger automobiles can all be serviced with one lubricating grease.

Safety in driving is aided by careful periodic application of extreme-pressure steering-gear greases, such as are discussed.

A combination universal-joint and wheel-bearing grease generally will not provide most efficient lubrication of the joint.

Approximate composition of a satisfactory water-pump grease is shown, and graphite spring greases for metal-covered springs are discussed.

REDUCTION OF EVAPORATION LOSSES FROM GASOLINE BULK-STORAGE STATIONS.—Ludwig Schmidt and C. J. Wilhelm, in BUREAU OF MINES TECHNICAL PAPER 565 (1935).

Evaporation of gasoline from bulk-storage stations is one of the major sources of loss in the marketing of gasoline; in addition, it is one of the most deceptive. The elusive features of this loss are due to the relatively large coefficient of expansion of gasoline. Frequently the variation of atmospheric temperature results in a change of several percent in the volume of the gasoline within a comparatively short time. For example, with gasoline of 60° A. P. I. gravity an increase in temperature from 60° to 80° F.—a total of 20° F.—will cause a volume increase of about 1.2 percent. Because gasoline is shipped from the refinery with volume corrected to 60° F. and is delivered by the bulk station on a strict gallonage basis, it is evident that bulk-station records do not show the amount of gasoline lost by evaporation. In fact, as a large percentage of the gasoline is handled by bulk stations during the summer, when the temperature of the gasoline is greater than 60° F., the records tend to conceal the evaporation losses.

Tests made by the authors show that the average gasoline losses by evaporation at bulk-storage stations, when transferring from tank car to tank trucks, may run to 0.71 percent, and around 0.48 percent when running to bulk station tank. Losses from an ordinary storage tank may amount to nearly two percent over an eight-day period.

As to measures for preventing these losses, there is a wide choice of expedients. The best is the use of vapor tight tanks. These not only reduce the losses, but also the fire hazard and insurance rates. But whatever system may be adopted, constant inspection and maintenance of the equipment in perfect working order are necessary for the best results.

Petroleum Substitutes

GASOLINE SYNTHESIS FROM WATER GAS.—Franz Fisher, in OEL UND KOHLE, vol. 11 (1935), No. 39, pp. 782–785.

In this paper Germany's leading investigator in the field of petroleum synthesis outlines the present status of the problem from the technical standpoint.

The starting material is wood charcoal, peat coke, brown coal coke, gas-house coke, or any other solid combustible matter which is convertible into water gas by blowing steam through the material in a state of combustion. There is no shortage of the necessary raw materials in most countries and especially not in Germany. The manufacture of water gas is already a well established art, so nothing remains but to convert this gas into hydrocarbons similar to those found in petroleum.

For the purposes of industrial petroleum synthesis, the first step is to remove most of the sulphur from the gas, followed by a "fine cleaning" which will remove the rest. Next, the purified gas is sent through a catalyzer. The best catalyzers are cobalt, nickel and iron, in the order named. The components of water gas being carbon monoxide and hydrogen (CO and H_2), the chemical reaction induced by the catalyzer is a reduction and hydrogenation of the monoxide and an immediate polymerization that results in hydrocarbons of low and high molecular weights. The principal products are volatile hydrocarbons boiling under 30° C. (8°C), light and heavy gasoline boiling between 30° and 200° C. (62°C), lamp oil and Diesel oil (24°C), solid paraffin (2°C), solid ceresin (4°C). The catalyzer housing may be of sheet iron construction, since the reaction takes place at ordinary atmospheric pressure and at a temperature of about 200° C. This part of the outfit costs much less than the plant for producing the water gas.

The technical possibilities of the proposition have been tested in a series of pilot plants, the latest of which has a capacity for producing 1,000 tons of gasoline per year. Calculations indicate that under the present German fiscal conditions, a plant producing no more than 25,000 tons of gasoline a year (480 bbl. a day) can operate profitably. The theoretically possible yield is 180 grams of liquid hydrocarbons per cubic meter of water gas; in practice it is possible to obtain 130 grams.

It has been objected that this process is uneconomic in that carbon is first oxidized and then reduced, for which considerable heat energy is required. This heat is recovered in the necessary operation of cooling the hot gas before it enters the catalyzer. Large quantities of steam are thereby produced for use in industrial process or for the production of electric power. According to the author, Germany is now in a position to make herself independent of foreign petroleum whenever the people and the government so desire.

ITALIAN MOTOR FUEL POLICY.—Anon., COURIER DES PETROLES, vol. 16 (1935), No. 676, p. 1.

The problem of motor fuel in Italy is presenting a variety of complexities and no small perplexity to the government. In spite of prodigious efforts the native production of petroleum remains insignificant; native coal production is absolutely insufficient for the needs of the country, let alone as a source of petroleum substitutes, and the forested area is insufficient to provide an important source of wood charcoal. Nevertheless, the government is doing all it can to diminish the imports of petroleum and to promote the use of substitutes. To achieve these ends, and also to lessen the strain on the country's foreign exchange, the government has adopted two far-reaching policies. The first of these is a substantial increase in the sales tax imposed on petroleum products, which raises the total tax to no less than 1,000 percent of the c.i.f. cost of gasoline, and to 70 percent of the retail price. Apparently the intent is to discourage the use of petroleum, a tendency which contrasts strangely with the great lengths to which the Italian government has gone to improve motoring conditions by road construction and financial assistance in the purchase of new vehicles.

The other measure is the new law contained in paragraph four of the decree issued August 28, which prescribes that all automobiles engaged in the "collective" transport of persons, whether public or private, urban or interurban, must be equipped, before December 31, 1937, to run by wood gasogene power or other petroleum substitutes. This affects busses and other vehicles for public hire, of which there are about 10,000 in the country out of a total of 545,113 automotive vehicles, and will mean the annual replacement of 50,000 to 70,000 tons of petroleum products by wood, wood charcoal and other fuels, including alcohol from sugar beets.

It has now been established that busses can attain top speeds of 135 kilometers (90 miles) an hour, using wood charcoal, the charcoal consumption amounting to 18 kilograms per 100 kilometers (40 lbs. per 66 miles, or about 1½ miles per pound). (Note: These figures should be accepted with some reserve. ED.) At this rate motor fuel expense will be reduced 90 percent, due to the high tax on gasoline. The forest industry will no doubt experience a corresponding stimulation.

Petroleum Economics

Developments of Kerosene Consumption.—Oskar Tokayer, in PETROL. PRESS SERVICE, vol. 2 (1935), No. 18, pp. 3–5.

It has been widely supposed that the demand for kerosene must in future decline steadily, especially in industrialized parts of the world. The rapid growth in the consumption of electricity for illuminating and domestic heating was, naturally, expected to hasten this decline.

However, when the actual trend of consumption of kerosene in the last few years is analyzed, very interesting results are disclosed. World consumption of kerosene, far from having declined, has risen at least in the same proportion as that of other petroleum products. As the following figures reveal, kerosene has not only kept its share in the world's oil consumption, but has even increased slightly more, proportionately, than the total consumption:

Year	World consumption of all oils	World kerosene consumption	Kerosene percentage of total
	in metric tons		
1932 ..	178,000,000	13,266,000	7.45
1933 ..	186,000,000	14,187,000	7.57
1934 ..	195,000,000	14,898,000	7.64

This shows that while total oil consumption has increased 9.6 percent, that of kerosene has increased 12.3 percent. Equally unexpected is the fact that kerosene consumption has increased slightly in the temperate zones inhabited by whites (excluding the U. S., Canada and Russia) and has slightly decreased in tropical and subtropical countries. Notable increases have occurred in Great Britain, Finland, Holland, Italy, Portugal and Roumania, but nowhere has the increase been more striking than in the United States, where, taking 1931 as a base, the increase in kerosene consumption for 1932–1934 has been 6.1, 18.2 and 15.2 percent.

So large an increase seems to require some explanation, and this is found mainly in the fact that the retail price of kerosene has steadily fallen, together with the appearance on the market of improved kerosene-burning apparatus, and in the increasing use of kerosene as fuel for small power units, such as farm tractors, small electric light machines, and fishing boats. Increasing electrification in many countries will doubtless cause a decline in kerosene consumption for illumination purposes, but its many other uses will doubtless give it a secure place in the market for a long time to come.

Provision of Motor Fuel in Europe. George Hanel, in PETROLEUM, vol. 31 (1935), No. 21, pp. 5–12.

Whereas the total annual consumption of liquid petroleum fuel in Europe is about 30,000,000 tons, the total production of all Europe except Russia is barely 9,000,000 tons, and by far the largest proportion of European production is in Roumania. Although at present all countries can obtain as much petroleum as they are able to pay for, the lack of native supplies is deeply felt for two principal reasons. Chief of these is the question of national defense, which under present conditions depends almost wholly on foreign fuels, the supply of which may be shut off entirely in time of war; the other is that oil imports put a heavy burden on foreign trade balances, and in some cases make forced compensatory exports an inescapable necessity. For these reasons the principal oil consuming countries of Europe are more and more turning their thoughts and efforts toward creation of supplies from resources that will be exempt from foreign political, military or commercial domination. In some cases provision is being made for storing enormous reserves of foreign oil against the time of need, but, beyond this, efforts are also being made to establish an artificial petroleum industry with coal as the basic raw material. This problem has been solved from the technological standpoint and in case of need all countries with large supplies of coal (England, Germany, France, Belgium) can make themselves independent of foreign petroleum. At the same time the possibilities of employing other sources of motor fuel (alcohol, wood) are being intensively studied.

Germany's Absurd Alcohol Motor-Fuel Economics. — Oskar Tokayer, in PETROL. PRESS BUREAU, vol. 2 (1935), No. 18, pp. 8–9.

By a recent law designed to favor the new wood-spirit industry and the manufacturers of synthetic methanol, this substance is included as a compulsory mixture with gasoline. The alcohol monopoly has had difficulty in securing supplies sufficient to fill up the quota assigned to it and has been obligated to import alcohol to make its mixtures; hence this stimulation to the wood alcohol industry.

This situation is full of anomalies. Although the cost price of the imported alcohol is much below that paid to the home producer, i.e., RM 21 per hectolitre against RM 47, even this lower price is almost fivefold the c.i.f. price of gasoline. For the RM 3.31 million paid for 127,180 hectolitres of foreign alcohol about 600,000 hectolitres of gasoline might have been imported; and, further, the government lost RM 13.16 million, which would have been paid in customs duty on the gasoline, whereas the alcohol is imported duty free. This is a typical example of the economical absurdity which may easily result from laws such as those requiring the addition to motor fuel of a prescribed percentage of alcohol. Instead of adopting the commonsense course of reducing the alcohol content of the fuel by one or two percent, the shortage of alcohol was covered by imports and thus an additional RM 2.6 million was unnecessarily spent abroad. Further, the import of alcohol was virtually a subsidy to foreign (principally Polish) producers, and was of no benefit to the German producer, in whose favour the alcohol law was enacted five years ago. As for the value of methanol, specially wood spirit, for motor fuel purposes, the verdict of the German motor industry is that it is "not worthy of serious discussion."

Relative Economics of Diesel and Gasoline Engines.—W. H. Butler and G. H. Freymouth, before North American Gasoline Tax Conference, Hot Springs, 1935.

A tabulation of applied Diesel horsepower in the United States shows the following: Marine, 1,081,400; general industry, 973,575; public utilities, 606,200; petroleum, 535,200; municipal lighting, 435,200; mobile (not including railroad), 616,800; Navy and Coast Guard, 274,200; cotton gins, 195,800; mines, 172,500; railroads, 164,800; ice plants, 110,000; waterworks, 105,400; irrigation and draining, 104,600; export, 131,600; government institutions, 77,500; buildings, 16,800; total, 5,601,075.

The "mobile" Diesel horsepower, which includes all Diesels on wheels (exclusive of railroad equipment) includes only about 11 percent of the total. Deducting farm tractors, motor boats, contractors' equipment and the like, the proportion of Diesel automotive vehicles on the roads becomes very small. There are, at present, about 900 Diesel engines operating on the highways today, and these are confined to hauling large loads over considerable mileage intervals.

In recounting the reasons why the Diesel engine, in spite of its undeniable fuel economy, has been unable to make more headway against gasoline engines, the first and most important at the present time is the higher initial cost of the Diesel engine. For a given horsepower, a Diesel engine costs between 50 and 100 percent more than a gasoline engine. The principal reason for this is the much lower production rate of Diesel engines at the present time, but there are certain inherent features of the Diesel, such as greater weight per unit of power, special materials of construction, expensive fuel systems, and special machining required, which probably will always maintain Diesel engine cost above that of the gasoline engine. Beyond the question of initial cost, there are other disadvantages commonly ascribed to the Diesel engine. While the matter is of course controversial, it is probably safe to say that the Diesel engine, in its present stage of development, is considerably less flexible (having a smaller speed range from minimum to maximum), noisier, rougher, and has in many cases more objectionable smoke and odor characteristics than the better gasoline engines. These features will undoubtedly be eliminated or minimized as development of the engine proceeds, yet they are today real factors.

In considering the field of application of this engine, it is safe to say that the Diesel engine cannot now, nor for some time to come, be considered as a possibility for application to passenger automobiles. Aside from the question of initial cost, which would be prohibitive to the automobile owner, the operating features expected by today's driver, of instant starting, rapid and smooth acceleration, high-speed performance, freedom from attention, together with the high power to weight ratios required for the performance characteristics of the present automobile, are such as to remove for a number of years hence any possible use of the Diesel in the passenger automobile.

Cross-Currents in French Oil Economics.—Oskar Tokayer, in PETROL. PRESS SERVICE, vol. 2 (1935), No. 18, pp. 1–3.

As the result of a strong effort France will soon be able to cover her oil requirements almost exclusively from her own refineries. Now the second largest oil consumer in Europe, in little more than five years France has almost completely changed the character of her oil imports, abandoning foreign refined products in favor of finished products manufactured at home. The 15 refineries now in operation can treat 5,000,000 tons of crude annually, and if this capacity is raised to 6,155,000 tons, as planned, the output of the refineries can hardly be absorbed in France alone for some years to come.

This expansion of the French oil refining industry is the result of the government's policy to give employment to as many as possible of its own citizens, both laborers and capitalists, but at the same time the government still keeps alive various circumstances that interfere with the free operation of this

domestic industry. With a refinery capacity now nearly equal to home requirements, the customs doors are still left open for the importation of a substantial quantity of finished oil products from foreign sources. Licenses to import have been issued for quantities far beyond any possible demand so that by October, 1934, the gasoline market became so overstocked that a wasteful price war was precipitated and is still in progress. The number of import licenses and the sizes of the import quotas will have to be reduced before the French oil market can be stabilized.

On the other hand, the French Government is encouraging projects that, if persisted in and carried to their logical conclusion, must affect the oil refining industry which it has taken such pains to create. This refers to the official attempts to establish a national production of synthetic motor fuel from coal, to introduce and popularize the wood-gas generator, and to bring other special fuels into use, particularly alcohol, which is forced on the motor users by pressure of the agrarian interests.

In these circumstances the French refining industry is having to make a strenuous fight to maintain its position. It is not yet able to write off from the cost of its equipment such sums as the rapid advance of technical methods and apparatus renders necessary. In French official circles it is considered that an amortization of the capital invested in refineries is necessary within 10 years. Of this there is no possibility, in the present condition of the French oil industry, for it would require that, in view of the insufficient amounts so far written off, the average of the remaining years of the decade would have to be considerably increased. The prospects of this are not at all encouraging. It will require the concentrated efforts of the industry to make certain of the "place in the sun" which the many privileges conferred upon it by the Government have encouraged it to hope for.

THE GOVERNMENT AND THE OIL INDUSTRY, THEIR MUTUAL OBLIGATIONS.—R. D. Parker, before Petrol. Div., Am. Inst. M. & M. Engineers, Houston, 1935.

In this paper, the chief of the oil and gas division of the Texas Railroad Commission sets forth a conception of the functions of the industry and the government in the public interest. The thesis is that the industry is and should be competitive, and that the Federal government has broad powers under the Constitution to control a national resource such as petroleum, which is indispensable to the national defense and would come under the clause which empowers Congress to make all laws necessary and proper for the raising of armies and to provide and maintain a navy.

According to the author, what the public welfare demands of the petroleum industry is:

That the needs of general industry and trade that are heavily dependent on petroleum be served; that an underground petroleum reserve be established and protected for national defense; that competition be maintained on a basis of efficiency; that free interstate movements of petroleum products be maintained for the supply of current and future needs of all the people of all the states; that the maximum and balanced yield of the various categories of petroleum products be realized to avoid waste (for instance, prohibiting distillation of straight run gasoline where the residual oil is not further refined by cracking); that the oil industry cooperate with other industries to avoid recurring cycles of prosperity, panic and depression; that an effort be made to maintain employment at a uniform level; and that the industry meet government half way "in an effort to perfect mutual benefits."

On the other hand, in return for the exactions of government, the industry has a right to demand: modification of the anti-trust laws which will enable the industry to agree to govern itself; protection from overproduction and "waste"; nationalization of the principles of the Sharp Decision of the Texas Supreme Court relating to the capture theory in controlled production; embargoes on the movement of illegally produced oil; uniform laws in all states regulating the industry, including prevention of economic as well as of actual waste; unbiased and efficient enforcement of all laws alike before all men; standardization of inspection service on a basis of knowledge of the business; permission to maintain trade associations and to meet upon grounds of common interest without fear of prosecution under the anti-trust laws; the maintenance of property rights; the right to unitize producing properties under a fair basis of distribution of property yields, and some form of satisfactory group control of marketing by the adoption of codes of fair practice and otherwise; a cooperative, constructive attitude of government officials toward business; revision of banking practices, or some governmental agency to restrict credit by means which will not break down a legitimate competitive system but will weed out the unfit; and finally, a proper balance of state and Federal authority within the constitutional sphere of each, so that each may supplement and aid the other cooperatively.

GASOLINE PRICES AND TAXES IN EUROPE. —Oskar Tokayer, in PETROL. PRESS BUREAU, vol. 2 (1935), No. 20, pp. 1–3.

In proportion as the motor car has developed into an important factor in economic life, gasoline has become a popular object of fiscal exactions, the more so as it has yielded increasing sums to the Revenue at relatively small cost. It is only in recent years, however, that such a disproportion between the cost factors of gasoline has been created that taxes actually form the greater part of the price paid by the public; and the influence of world market quotations on the selling price of gasoline in the various consuming countries, instead of being decisive, as it always was until about 1930, has become almost imperceptible.

Percentage Taxes Imposed on Motor Fuel Prices

	Filling Station Price in national currency per litre		Taxes and Duties in % of Filling Station Price	Taxes and Duties in % of c.i.f. Price
Rome	Lire	2.79	71.0	861
Paris	Frs.	2.13	73.4	651
Berlin	RM	0.35	56.6	521
Vienna	Sch.	0.59	64.4	391
Prague	Kc.	2.90	52.4	353
Brussels	Bfr.	2.35	65.5	335
Amsterdam	Fl.	0.135[a]	52.37	310
Zurich	Sfr.	0.43	54.7	305
London	£	1/6d[a]	44.4	232
Budapest	P.	.43[b]	51.2	216
Copenhagen	Kr.	0.31	41.9	173
Stockholm	Kr.	0.27	37.4	155
Oslo	Kr.	0.26	38.5	152

(a) Nominal filling station price; (b) Price for "Motalko" alcohol blend; (c) Price per gallon.

To illustrate this disproportion, the author gives the accompanying table of motor fuel prices in the more important capitals of Europe with their relationship to the fiscal burdens imposed on them, on the one hand, and to the c.i.f. gasoline prices, on the other.

It is self-evident that such a fiscal policy must have affected motor fuel consumption most seriously. The private motorist could only protect himself by changing over to an increasing extent to the smaller gasoline-saving types of cars, while commercial traffic solved its difficulties by adopting the Diesel motor, which received an enormous impetus as a result of the excessive taxation of gasoline.

Books

CHEMICAL ENGINEERING CATALOG (1935); 20th Annual Edition. 863 pages; New York

This excellent reference book of equipment for the process industries has now achieved its twentieth year and is more complete than ever; the present edition has increased by more than 100 pages over the previous one. Any person seeking information on any kind of equipment that might be used in any phase of chemical industry (including the oil industry) has a good chance here of making contact with at least one firm that can supply what is required. The wealth of technical information here spread before interested readers is truly impressive. This refers not only to mechanical appliances; there is also very complete, detailed and accurate information regarding chemical products, and the book section is an extensive bibliography of current works on all phases of chemical technology.

COMPILATION OF A.S.T.M. STANDARDS ON PETROLEUM PRODUCTS.—published 1935; Philadelphia, 358 pages. $1.75.

Each year A.S.T.M. Committee D-2 on Petroleum Products and Lubricants sponsors the publication under one cover of all A.S.T.M. standards pertaining to petroleum. The current edition, 1935, contains 57 test methods, six specifications and two lists of standardized definitions of terms, all of this material being given in its latest approved form.

The current report of Committee D-2 comprises an interesting discussion of the work on the Sligh oxidation test with a proposed method of test for oxidation number of lubricating oils by the Sligh method and gives the revised Diesel fuel-oil classification which is published for information.

A new method of test given for the first time covers the vapor pressure of motor and aviation gasoline (Reid method). During 1935 a number of the standard methods given in the compilation have been revised, including those covering the following: test for dilution of crankcase oils, distillation of gasoline, naphtha, etc., ductility of bituminous materials, testing emulsified asphalts, flash point by means of the Tag closed tester. Changes also have been incorporated in the tests for residue of specified penetration, precipitation number of lubricating oils, viscosity by means of the Saybolt viscosimeter and water and sediment in petroleum products by means of the centrifuge.

In addition standards for all the usual tests are given in detail.

CANADA

Imports

IMPORTS of crude into Canada during September amounted to 127,017,748 gallons valued at $3,700,395, as compared with August's figures of 126,729,590 gallons valued at $3,714,858. The September, 1935, figures also show an increase of 8,806,927 over the September, 1934, figures. Countries of origin for September of this year were as follows:

United States	97,998,459 gallons
Colombia	14,813,757 gallons
Peru	6,669,556 gallons
Venezuela	7,535,976 gallons

Gasoline imports for September were 2,377,135 gallons valued at $192,891, compared with 1,393,307 gallons for September of last year, valued at $131,109.

General

THE Blackfoot Development Company is the name of a new company which has been incorporated with a Saskatchewan charter. Amalgamated Oils is interested in this new company which holds leases on about 20,000 acres of land in the southern Saskatchewan field. One well is already down 1,750 feet, some miles south of Regina. It is dry and is going to be left cased. A new well is to be put down 3,500 feet, and will probably penetrate the lower possible horizons.

Another new company to be formed is Hudson Bay Junction Oils Limited, with Saskatchewan charter. Acreage is held by a number of independent companies such as Trail Blazer Oil and Gas, and Amalgamated Oils Limited. A test well will be drilled on the northeast end of the structure.

A deep test well has been spudded in at Kakwa by Amalgamated Oils. The rig has been housed for the winter, and gas from No. 7 test well is being used for both fuel and heating purposes. Work done to date indicates that the structure rises 100 feet from Hudson Bay Junction, where heavily saturated oil sands were found in drilling the Trail Blazer well at 590 feet a year ago. The No. 7 well was spudded in with the intention of making it a deep test, but greater quantities of gas came in than at any of the other wells at 206 feet, and the company realized that this came from a sand which had not been encountered in the other wells.

Union Freehold, third well nearest production in the south Turner Valley field, is down 5,150 feet after considerable delay. Reports are that the hole is in good shape.

The Terminal well on the Del Bonita structure, 35 miles west of Coutts, is to be drilled again, this time with rotary equipment. The original drilling, which took it down 4,830 feet, was done with cable tools. If the limestone is reached soon, other companies are intending to drill nearby.

Highwood Sarcee No. 2 well, in the Turner Valley field, has been spudded, and British American have acquired an interest in it.

New Valley well, drilled by Macleod Company, is down past the 3,500 foot level.

Model No. 3 encountered the limestone at 5,733 feet, about 70 feet shallower than at Model No. 1. It is believed that some drilling records were established in putting down this well.

Royalite No. 27 has been spudded in at the north end of the Turner Valley field, and is down over 200 feet.

Mar-Jon No. 3 has penetrated the Blairmore formation to a depth of 400 feet on the Watson structure. It is down more than 3,400 feet. British American has an interest in this.

The gasoline market on the Island of Montreal is still disorganized. Harry Snyder, chairman of the board of directors of Champlain Oil Company, states that "bootlegging of gas has again made its appearance on the Island of Montreal, and so long as this condition prevails and so long as the public is willing to purchase inferior gas at low prices, I can see no remedy in sight." He estimates that the disorganized state of the market accounted for a loss of 750,000 gallons of gasoline. Therefore regular dividends of this company have been suspended.

R. C. ROWE

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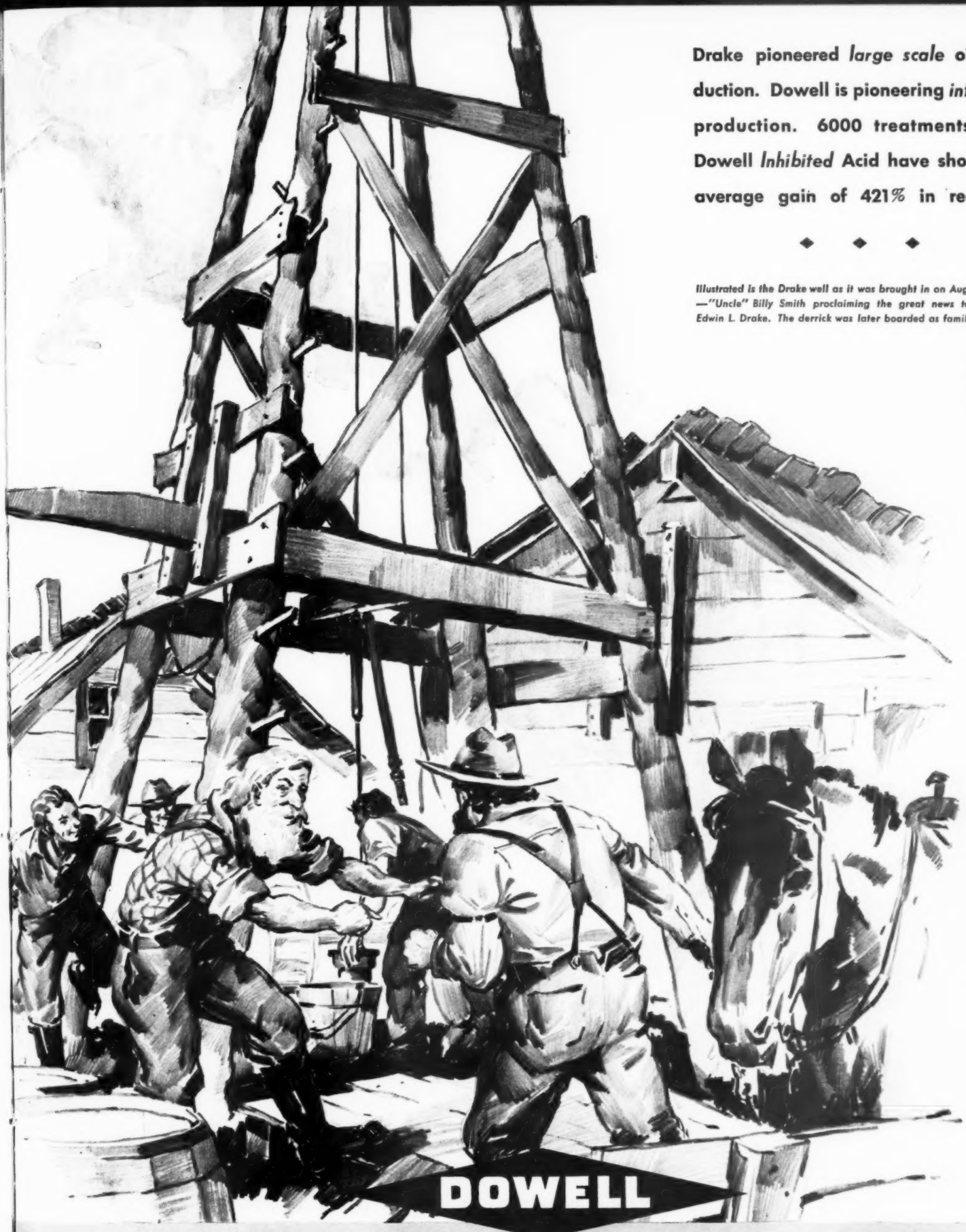
Official Figures for Soviet Oil Operations

	Crude Production (bbl.)	Daily Average (bbl.)	Run to Stills (bbl.)	Drilling (feet)
January	13,358,000	430,935	11,400,000	248,672
February	12,704,300	453,725	10,909,500	334,000
March	14,139,300	456,609	11,714,000	449,417
April	14,058,200	468,609	12,052,600	332,843
May	15,248,800	491,897	12,516,000	421,225
June	14,232,400	474,414	12,312,300	474,029
July	14,050,000	453,226	12,315,000	449,750
August	14,230,000	469,032	12,250,000	449,900
September	14,318,000	477,267	12,300,000	448,950
October	15,160,000	487,263	12,650,000	376,300
Total 10 Months 1935	141,499,000	465,447	119,654,400	3,983,986
Total 10 Months 1934	139,629,190	459,306	122,658,600	3,507,596
Total 1934	168,648,700	458,042	145,141,000	4,122,898
Quota 1935	212,310,000	581,672	171,500,000	5,214,000
Quota 1934	214,900,000	588,876	161,000,000	4,950,000

Crude conversion: seven barrels = one ton

FOR the first time in many months, Baku reported a definite and substantial increase in crude production during October. Various wells were brought under production at Balakhani, Ilyitch Bay and elsewhere at the four producing trusts of Baku, and plan fulfillment now amounts to 94–96 percent, as compared with 80–82 percent during the past six months or more. At some of the oil field groups, plan fulfillment of three to five percent above quota on individual days has now become a common occurrence. Daily average of crude production for all Baku has again reached 388,000 to 390,000 bbl. and the increase over previous months is between 20,000 and 25,000 bbl. per day.

The Grozni oil fields continue to operate at the rate of 83–86 percent of plan, while the Molgabek oil field, which is expected to enable Grozni to attain plan fulfillment, is still await-



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OIL AND GAS WELL CHEMICAL SERVICE

ing deep drilling development. Soviet drilling operations, however, may be expected to meet difficulties in this direction for some time to come. Maikop oil fields are being operated at 92–94 percent of plan, and on individual days crude production of these fields runs ahead of schedule. Improvements are also reported from Emba and Middleasia oil fields. At Emba, the recent additions of Koschagil and South Iskin have augmented the daily average of the region by about 10,000 to 12,000 bbl. which is carried to Guryeff on the Caspian Sea by a recently completed branch line of the Caspi-Orsk trunk line, now under construction. The Middleasia fields, Haudag and Neftdag, known for flush production in 1932, have again shown activity and several new wells have added considerably to the daily average of these properties.

It is, of course, difficult to forecast whether the improvements reported during October will bring about the long expected turn in the tide. Thus far, production for the year is more than 30,000,000 bbl. behind plan schedule, the greater part of this deficiency (20,000,000 bbl.) being caused by the failure of Baku. With only two more months before the end of the year, however, full recovery is hardly to be expected. This season of the year, moreover, brings adverse weather conditions which make routine maintenance of operations extremely difficult. Total Soviet crude production for 1935 will probably run between 162,000,000 and 164,000,000 bbl., almost on a level with last year's figure. At any rate, it will very closely follow the forecast made by WORLD PETROLEUM at the beginning of 1935.

During the first ten months of 1935 production in Soviet Heavy Industries showed a 25 percent gain over the same period last year, while oil and gas showed a 2.5 percent gain and refining operations a 2.4 percent gain.

The total increase of 25 percent during the ten month period is in excess of the plan figure of 19 percent. The official report states, however, that the output of equipment for rolling mills, output of boilers and water turbines, and production of crude oil are still unsatisfactory. Employment in heavy industries for the period has increased 6.5 percent over last year, while there was an increase of 16.8 percent in wages paid, showing that the increased production has been attained by a considerably increased labor productivity.

Soviet Crude Oil Production Since 1821

(figures in tons)

Pre-War Russia:	
1821–1900	90,565,200
1901	11,570,300
1902	11,079,700
1903	10,415,000
1904	10,887,800
1905–1912	70,821,300
1913	9,192,700
1914–1918	41,534,300
Total	256,066,300
Soviet Russia:	
1919	4,128,600
1920	3,850,600
1920–1921	3,823,000
1921–1922	4,662,100
1922–1923	5,282,800
1923–1924	6,071,000
1924–1925	7,065,200
1925–1926	7,321,100
1926–1927	10,285,300
1927–1928	11,625,400
1928–1929	13,704,600
1930 (including special quarter)	21,629,000
1931	22,487,300
1932	21,518,400
1933	21,681,400
1934	24,204,800
Total	189,340,600
Grand Total	445,406,900

Soviet Oil Exports

WITH world crude oil consumption figures indicating steady gains during 1935, production in most countries has been increased accordingly. Soviet oil production, however, has not increased, while Soviet exports have decreased. Having reached the high figure of 42,000,000 bbl. of petroleum exported in 1932, it was expected that this tempo of acceleration could be maintained during the following years. When plan fulfillment was not realized, however, revisions were made and the figure for crude production in 1935 was brought down to 232,000,000 bbl. and subsequently to 213,000,000 bbl. Production for the last ten months has reached only 80 percent of the revised quota, and in view of this fact it does not seem likely that total crude production for 1935 will exceed last year's total of 168,000,000 bbl. Total exports are expected to be below last year's figure. The substantial increases attained in all other branches of the Soviet Heavy Industries only serve to accentuate the failure to increase crude production. Needless to say, the steady diminution of Soviet oil exports since 1932 has removed, to a considerable extent, the price threat of Soviet exports from world markets. In 1932 the Soviet policy was to gain new markets at any cost, regardless of the selling price of the oil; whereas today, possessing only a limited supply for export purposes, they are holding out for the highest possible price.

In the case of England, Soviet oil exports have fallen off from about 7,000,000 bbl. in 1931 to 1,750,000 bbl. in 1934, and to 1,323,308 bbl. for the first eight months of 1935. The Soviets now realize that the maintenance of R.O.P. in England as a marketing organization represents a disproportionately high disbursement as costs must be paid in pound sterling. Their greatest profit lies in the sale of oil to a country in bulk, leaving the distribution to the well established and more efficient capitalistic marketing organizations. In this manner, of course, the only gold cost of the oil to the Soviet treasury is the freight charges from Russia to point of sale. This might even suggest that Soyusnefteexport may find it advisable to dispose of their marketing facilities in England as they have with DEROP in Germany to the Benzol Verband. Another disturbing factor in the Soviet oil trade in England is that, in order to supply the demands of R.O.P., the Soviets had to buy gasoline at the Gulf at full world market price, and sell at a loss. It must be remembered, too, that the operations of a government owned organization are less flexible, and therefore more costly, than those of a privately owned distributing organization; also, exports to England may have decreased, but the same maintenance costs and distributing facilities are necessary.

Soviet oil exports to France have also dropped, and it is evident that they have experienced some difficulty in fulfilling their contracts for fuel oil with the French navy; as well as other contracts with independent companies. Today France buys a large part of her oil from Roumania.

In Germany, as has been mentioned, the Soviets have sold DEROP, their distributing organization. The German government has made arrangements with Roumania under which German oil importers are allowed to pay for Roumanian oil in marks in full, and these marks can be taken out of Germany at full par value. This places the Roumanian exporters in an advantageous position over the Soviet and American exporters, to whom German marks are frozen and traded under a discount.

Italian imports of Soviet oil have also decreased, and the Italian government has likewise made arrangements for the importation of oil from Roumania. Italian oil importers have to cover not less than 50 percent of their requirements by imports from Roumania.

Soviet oil exports to Spain, Scandinavia and Belgium have dropped considerably. Oil exports are maintained to Iran, but this is made necessary by political reasons, and besides Soviet barter with Iran is important for reexport (carpets, objects of art, dried fruits, etc.).

Soviet sales of oil to Standard have dropped considerably. Up to 1932 Standard Oil used to buy 25–30 percent of the total Soviet oil exports. Today practically all contracts have expired and have not been renewed. Soviet oil is still bought by Standard for India; as are requirements in fuel oil or other products for the Levant markets, Egypt and Syria. These, however, cover only a fraction of former purchases.

OIL has ceased to be the hen which lays the golden eggs for the Soviet treasury. This is doubly unfortunate, since oil is not only an important source of revenue but also an important political tool. It is no secret, of course, that various European powers with no oil resources of their own are decidedly anxious to establish a stable and continuous source of petroleum supplies. From the standpoint of geography and transportation, Soviet sources are more strategically located than are Gulf or California sources. Providing the Soviets have sufficient oil available for export there should be no difficulties encountered. The fields of the Caucasus are situated near Black Sea ports and are connected to it by three pipelines with a total capacity of about 35,000,000 bbl. per year. Other transport facilities are available for at least 14,000,000 bbl. yearly, and in case of necessity the Soviets today are in a position to build additional pipelines within a year.

Another advantage held by the Soviets is that they trade with and buy from practically all countries of the world. For this reason German marks, Italian lira, or other frozen monies which are prohibited from being taken out of the country of origin really provide no obstacle to the Soviets. They are perfectly

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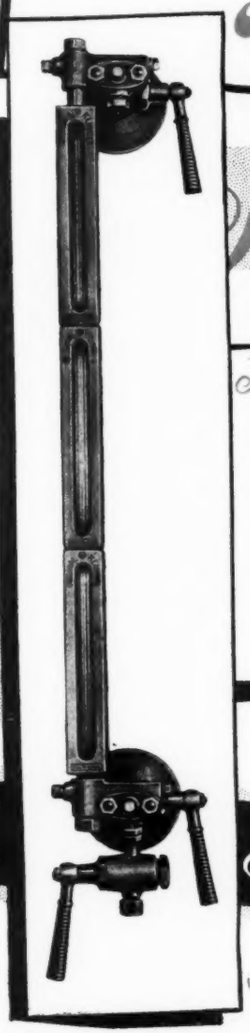

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willing to take payment for the oil sold in the form of goods of equal value.

In addition, with consumption of petroleum on the increase, the Soviets have encountered little serious resistance in the form of quotas on the importation of oil to Europe, as is evidenced by the 42,084,000 bbl. exported in 1932. Under prevailing conditions, continued Soviet oil exports at the 1932 rate or even higher, would have encountered less resistance than American or British oil exports.

It is fairly obvious, then, that the primary cause of the failure to maintain oil exports is not European discrimination against Soviet products; nor can it be ascribed to uneconomical marketing methods, as under Soviet financial organization any exports result in a net gain for the Soviet treasury. While it is true that in 1934 Soviet home consumption of oil products had increased 9,500,000 bbl. over the 1932 figure, it will be noticed that exports during this period have dropped by more than 12,000,000 bbl.; thereby eliminating increased consumption as the entire explanation.

Soviet Production, Consumption and Exports in bbl.

Year	Production	Consumption	Exports
1930.....	133,200,000	71,232,000	33,621,000
1931.....	156,300,000	83,195,000	36,568,000
1932.....	149,725,000	100,520,000	42,084,000
1933.....	149,901,000	93,820,000	33,600,000
1934.....	168,600,000	110,000,000	30,000,000

The underlying causes are to be found in an entirely different direction. Briefly, they can be summarized in two words—insufficient production. A nation cannot export what it has not got, and that is what the Soviets are up against.

In 1932, believing they had mastered the technique of drilling and production, and assuming that they were now capable of building their own equipment, importation of foreign equipment was stopped. This was where they made a grave mistake, as subsequent operations have only too vividly shown. At no time have either England or Germany, which are both highly industrialized nations, attempted to follow such a course, realizing full well it would be doomed to failure. Only Bolsheviki courage and obstinacy would have overlooked this factor, dismissing it as "bourgeois psychology." The fact remains, however, that equipment built by Soviet domestic machine shops is still unfit for heavy duty in deep drilling, and all new drilling has to be done at greater depths. Exploration and prospecting operations have been retarded as well.

It must be realized that self-criticism from within has not been lacking. Soviet oil experts and responsible men in key positions have repeatedly warned of impending danger and curtailed production, but this was looked upon as sabotage and deviation from party lines. It was firmly believed that all difficulties were of the past, and that it would be an easy job not only to reach American production standards, but to surpass them.

Reviewing Soviet oil exports by individual products, it will be noticed that while exports of light products, predominately gasoline and refined oil, have dropped considerably, exports

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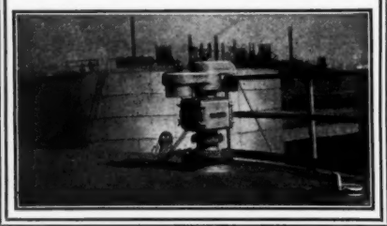

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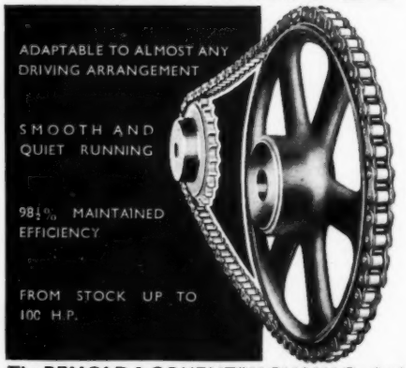
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of dark products have been fairly well maintained. Revenue from dark products is, of course, negligible when compared to revenue from light products. The explanation for the failure of the Soviets to produce sufficient light products for export is to be found in the poor showing made by Grozni during the past few years.

Grozni production has fallen from over 63,000,000 bbl. in 1932 to 23,100,000 bbl. in 1934, but refineries were erected at Grozni and Tuapse capable of handling nearly 91,000,000 bbl. yearly. Grozni crude is a light grade and contains up to 24 percent of gasoline, while Baku crude contains only about four percent gasoline (but a good grade of lubeoil), and it is becoming increasingly hard to obtain even this four percent. In order to keep the technically superior Grozni refineries on stream, Baku crude has been shipped to Grozni. Naturally enough, under these conditions the heavier grade Baku crude yields an even lower percentage of gasoline (two or three percent), since Grozni refineries were designed to process a specific grade crude. In this respect, the Soviets have found themselves in the same predicament as were some of the French refiners trying to refine Iraq crude.

As has been mentioned, all these weaknesses in the Soviet petroleum organization have been pointed out and criticized by certain of the Soviets themselves in a frank and sincere way; the blame, however, has invariably been passed to other quarters or to a difficulty of another nature.

It would be absolutely incorrect, however, to assume that the Soviets have completely lost and will not regain their former position in crude production and the international oil trade. But in order to regain it, they will have to spend another $25,000,000 to $30,000,000 in the United States for oil field equipment, which will enable them to increase production again. The Soviets have made up their minds to do this as soon as possible, and to undertake a new reconstruction of the drilling and production ends of the industry. They have the resources and means to revive exports to the level of 1932, or even above. European consumption is expanding and the financial position of the Soviets is more sound than ever before. All indebtedness to foreign countries has been practically liquidated and they show a favorable trade balance of Rbl. 146,700,000 in 1933 and Rbl. 186,800,000 in 1934. Soviet gold reserves in the treasury are estimated to be in excess of Rbl. 850,000,000; this year's crop promises to be a record one. Thus it can be seen that the Soviets are in a position to reconstruct entirely the oil industry or any of its branches, without in the least endangering national credit.

Soviet oil exports will undoubtedly increase in the future, and it is believed that all representatives of the large oil concerns who are under the impression that Soviet oil has been eliminated as a factor in world markets will be disappointed—perhaps within the next two or three years.

J. WEGRIN

Soviet Petroleum Exports

(Tons)

	1932	1933	1934	8 Months 1935	8 Months 1934
Products					
Crude Oil	525,915	525,518	458,519	22,538	151,443
Gasoline	1,972,300	1,260,081	1,119,938	439,016	829,068
Kerosene	828,776	570,228	435,573	278,720	268,298
Lubeoil (incl. Br. St.)	232,340	291,440	279,471	186,120	184,537
Gasoil	552,102	576,277	591,385	329,860	384,518
Fuel & Diesel oil	1,945,794	1,633,628	1,385,902	975,051	926,618
Paraffin	.....	.....	14,138	16,350	332,714*
Total	6,001,000	4,890,000	4,310,000	2,127,655	2,777,196
Destinations					
Italy	1,055,900	998,682	872,170	158,084	414,793
France	967,224	719,230	714,630	264,799	510,462
Germany	540,389	505,500	478,530	322,286	289,538
Japan	368,024	366,442	148,840	27,753	17,158
Spain	431,051	342,158	479,540	143,506	353,920
England	621,606	312,398	250,000	189,044	314,934
Belgium-Luxemburg	277,879	259,652	156,680	76,941	110,235
Sweden	271,610	218,618	141,430	99,575	142,852
India	204,990	176,425	185,950	*	*
Denmark	103,035	122,533	157,740	76,013	59,382
China	94,508	106,750	49,240	*	*
Egypt	268,029	100,372	67,150	*	*
Turkey	117,484	56,099	20,790	37,612	10,916
Greece	66,314	29,739	.....	.....	.....
Holland	72,900	61,132	26,939	*	*
Norway	65,141	60,799	22,710	*	*
So. America	30,831	72,436	51,830	*	*
Iran (Persia)	65,426	32,886	37,243	23,696	17,905
Finland	20,065	20,229	22,480	*	*
Baltic Estates	36,642	33,700	44,460	*	*
All other (Approx.)	426,969	294,036	248,540	713,446	535,101

*Included under others.

Value Oil Exports in Rbl. 8 Mos. 1935; 26,610,000
8 Mos. 1934; 40,150,000

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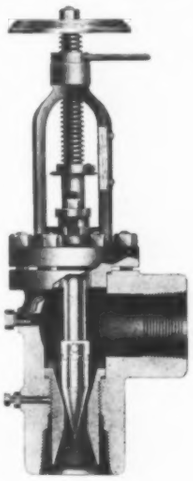

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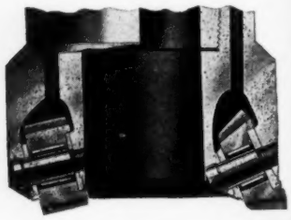

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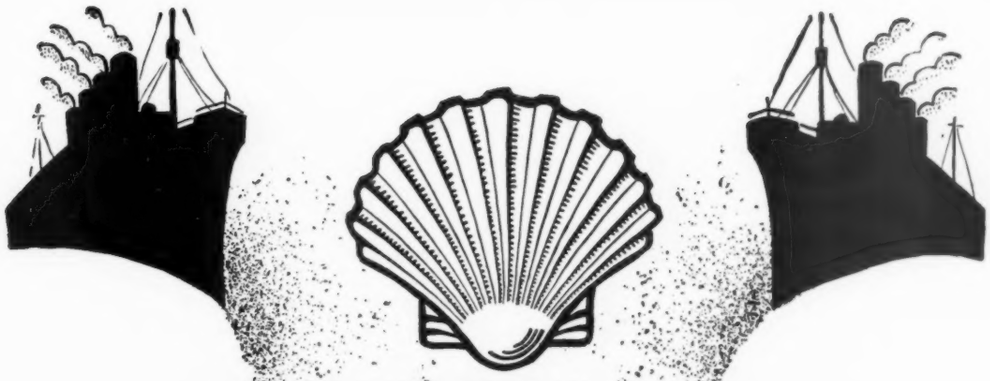

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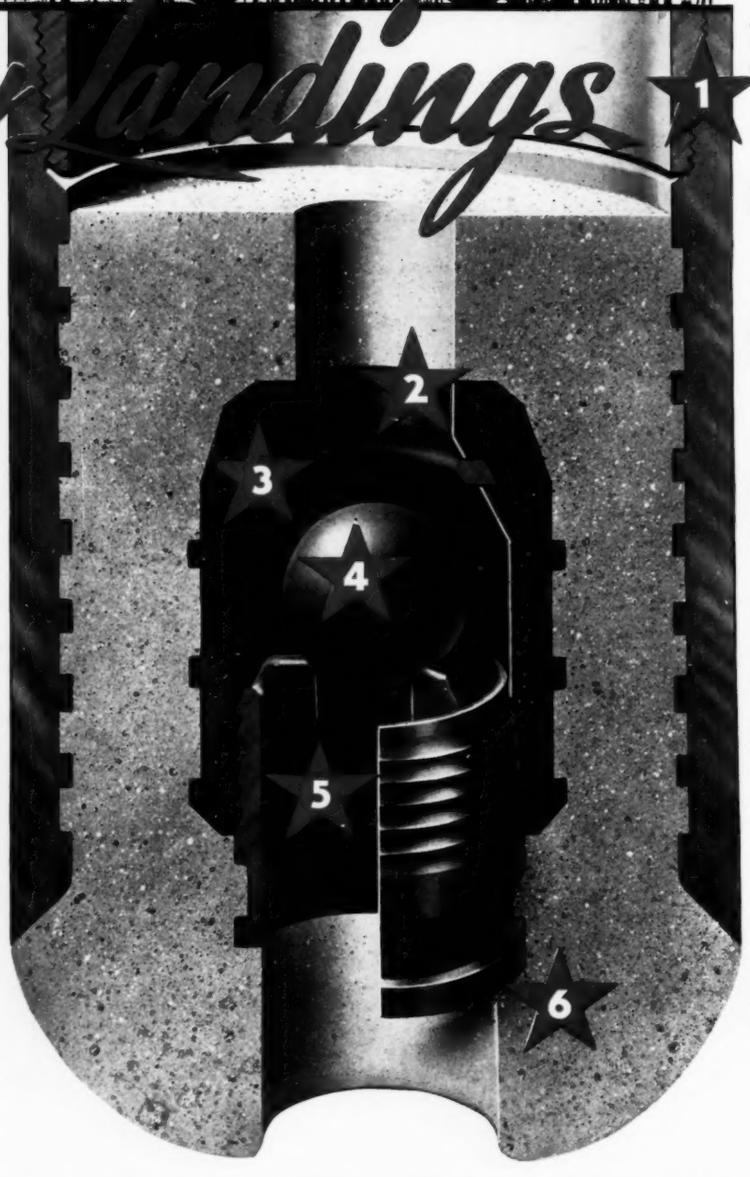

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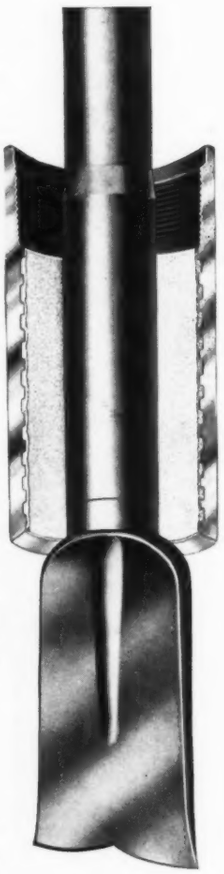

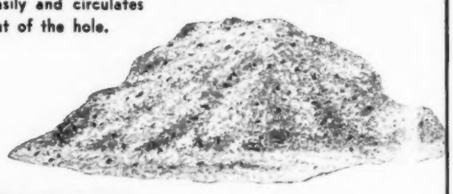

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